

medical education
for foreign scholars
in the medical sciences

**Report of a Conference
held at
The University of Wisconsin
Madison, June 24-26, 1957**

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Report of a Conference on Medical Education

for Foreign Scholars in the

Medical Sciences

Madison, Wis.

June 24-26, 1957

***Medical Education for Foreign Scholars
in the Medical Sciences***

Guest Editor—Robert Parkin, M.D.

The Conference was jointly sponsored by:

ASSOCIATION OF AMERICAN MEDICAL COLLEGES

CONFERENCE BOARD OF ASSOCIATED RESEARCH COUNCILS

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ASSOCIATION OF AMERICAN MEDICAL COLLEGES

Introduction

JOSEPH C. HINSEY, Ph.D.*

THE CONFERENCE ON Medical Education for Foreign Scholars in the Medical Sciences held at the University of Wisconsin Medical School in Madison on June 24-26, 1957, was the first such conference to be limited to the field of medicine. It was co-sponsored by the Conference Board of Associated Research Councils and the Association of American Medical Colleges, and was financed by a grant from the China Medical Board of New York, Inc., Dr. Harold Loucks, Director.

The Planning Committee organized the conference because of a need for general information on medical education and medical school administration among foreign physicians and educators. The Conference Board of Associated Research Councils; the Rockefeller Foundation; the Kellogg Foundation; the China Medical Board and the Department of Health, Education and Welfare were invited to send representatives. A total of 50 foreign scholars was designated as the upper limit.

The conference was organized into lectures followed by discussion sessions. Subject matter included the following broad topics:

1. The Philosophy of Higher Education in the United States
2. The Education of a Physician in the United States
3. The Evaluation of the Applicant for Medical Education
4. The Organization and Objectives of a Medical School
5. The Development of the Medical Curriculum
6. Recent Trends in Medical Education

Each section included a chairman and two "resource persons" who were United States medical educators; as well as 10 foreign scholars, one of whom acted as recorder. Discussion following the evening presentation was carried on in a Plenary Session.

The group was housed in a university dormitory which permitted the use of free time for intergroup discussion.

In general the reaction to the conference was good. Discussion, both in the total group and in the small group sessions was spirited and stimulating. Every attempt was made to cover the broad subject matter in the formal

* Director, the New York Hospital—Cornell Medical Center, and Chairman, the China Medical Board of New York, Inc.

presentations. Criticism from the foreign scholars indicated that participation by foreign scholars in the presentation of medical education as it is carried out in their country, might have been a valuable addition to the conference. The question always arises as to how much material can be included in such a short period. However, the purpose was not to debate the relative merits of any system of medical education. It was to give an over-all view of our programs of medical education, to illustrate the variations in our different schools, and to call attention to present trends and experiments that are in progress.

The substance of the conference is contained in the following papers. Its value can be judged by each reader. In my opinion, the conference performed a unique service which might well be repeated in successive years.

Address of Welcome

E. B. FRED, Ph.D.*

IT IS INDEED an honor to welcome such a distinguished group of world scientists and educators to the campus of our university.

We hope you take advantage of every opportunity to visit our laboratories and walk through our campus at this beautiful time of the year. We sincerely believe you will find this conference a profitable one, and we hope your memories of our campus, our lake, and your associations here will be as valuable to you personally as this conference will be to medical progress in your respective countries.

I understand this is the first conference of its kind to be held anywhere in the United States. Its success should initiate a more general effort on the part of American medical educators to assist in the improvement of medicine throughout the world. The University of Wisconsin is indeed fortunate in having been permitted to organize and present this conference.

World health is unquestionably one of our greatest problems. I believe its influence upon world peace and prosperity is more important than generally realized. Health is at the very base of human physical and intellectual progress. Without it, improvement in living standards is exceedingly difficult.

We at Wisconsin have been grateful for the opportunities extended to us to help train the world's medical scientists. Yet, often, we have felt that these scientists, coming to us to study, remained isolated.

Concentrating on their immediate problems of research and study, they devoted their days to learning of the new advances in physiology and pathology and the many specialties. This work is the basis of medical science, but when we limit education to these subjects alone, we are not realizing our full potentialities.

* President, University of Wisconsin.

This conference, we hope, will convey to you something of the philosophy of education in the United States, the aims and extent of our medical curricula, the newest trends in medical education. This conference represents an experiment in training medical educators as well as doctors and scientists.

I think we should express our gratitude to the agencies that have made possible this conference. It is being supported primarily through a grant from the China Medical Board of New York. Representatives to the conference have been invited by the China Medical Board, the Conference Board of Associated Research Councils, the Rockefeller Foundation, the Kellogg Foundation, and the United States Department of Health, Education, and Welfare. To all of these: our deep gratitude.

Let me welcome you again to our campus. May your visit be a most enjoyable and profitable one.

Higher Education in the United States

HENNING LARSEN, Ph.D.*

NOWHERE IN THE WORLD has more time, more money, more thought been given to problems of higher education than in America. The causes back of this seem rather simple. A desire for independence from authority—both spiritual and governmental—led millions of settlers to our shores, beginning in colonial times but continuing through the 19th century, until World War I and its aftermath temporarily turned the tide the other way. On our shores a spirit of democracy more or less consistently developed and—at least theoretically—dominated our thinking and practice. An almost inevitable consequence was the growth of the idea—dominant now—that everybody capable of benefiting thereby is entitled to higher education. Even a more potent force stimulating our desire for education is our economic growth. The 19th century brought wealth—large fortunes, small fortunes, and just widely spread economic independence; wealth made education possible; wealth stimulated the desire for collegiate training for social prestige; and through training and skills more prosperity was produced.

The 19th and 20th centuries have seen a fabulous growth of institutions of higher learning both in number and extent of plants and of curricula. In the heyday of corporate growth and development of vast trusts, and before the world wars with their resulting multiplying of taxes, capitalists poured millions upon millions into the building and support of colleges and universities; and more slowly, but parallel to the private and endowed schools, came an expansion of state colleges and universities supported wholly or in large part by direct taxation. The latter movement started early but received its greatest impetus through the enactment of the so-called Morrill Act for the establishment of land-grant institutions with the specific purpose of furthering the education of the common people and of emphasizing the practical fields of agriculture and mechanical arts. With the powerful support of Federal aid, these institutions have prospered and have become potent forces in educational planning throughout the nation.

Though the results have been remarkable in many ways, failures, too, are evident on all sides—failures, or possibly more fairly called shortcomings; the choice of term depends largely on personal opinions or personal prejudices.

* Vice-President, University of Illinois.

In estimating our success or failure, many of our educators view our work through rose-tinted glasses; others, with jaundiced eye suggest that, in our democratic expansion, we have let quality slip and let mediocrity grow.

In viewing our purpose and our achievement, I shall divide my theme into four major segments, representing, as I believe, four approaches to (I hardly dare say philosophies of) higher education. In making these four divisions, I recognize that there is infinite variety within each category and that there is no clear chronological division between the four. Actually they overlap constantly and elements of the earliest may survive through various vicissitudes even in the last.

First, we have the rather simple period of our first colleges—institutions for liberal training of a prescribed sort. Second, comes the period of the free electives and the complete breakdown of the traditional curricula. Third, comes the great reaction with the slogan *General Education*. Fourth, comes the problems of today with the vast increase of college population in a generation frightened and nervous over the atomic age.

To move to the beginnings, education beyond the grades began with us on a limited scale. It had a class distinction not now tolerated. Education was not necessarily limited to families of wealth but it was aimed at the training of professional men of competence—especially clergy and teachers, but also lawyers and doctors—men of culture well versed in traditions of the past, trained in the literatures of Greece and Rome, in mathematics and in philosophy. It was basically the English pattern for the training of a gentleman. Practical training for medicine and law was supplemented in the office or laboratory of private practitioners—more often than not the only kind available.

After a couple of centuries of education of this nature, the country moved to what I have named the second phase. The change was revolutionary. At first a gradual modification of old curricula became apparent; the purely classical course gave way to one in which the study of modern languages and literatures was added; the new did not displace the old but merely nudged aside the older disciplines and occupied some of their time. Even so the general plan was set and few vagaries on the part of the student were tolerated.

The real break in the traditional curriculum came in the '70's and '80's of the last century, when Harvard, under the leadership of President Eliot, launched the elective system. Given impetus by the prestige of the first institution of higher learning of the land, the new plan spread rapidly over the nation. The colleges were ripe for change; for, with ever increasing enrollment from the common people and the new stress on practical training, the rebellion against what was by many judged "useless" knowledge grew strong. With the elective system came a flood of specialized courses and specialized fields of training. At Harvard the system grew so liberal that the only required course was one in English composition.

The whole movement toward free choice of subjects received added stimulus from Germany. From the middle of the 19th century, it became

fashionable for the young scholar to seek advanced training in Germany. Where English tradition formerly was dominant, the German system now took over. Highly specialized training, with focus on research and publication, gained control. Our young scholars returned to become leaders in the creation of our modern graduate schools—at their best, training centers for research and high scholarship; at their worst, Ph.D.-mills to supply teachers for our collegiate institutions.

Under the new influence in our colleges, the danger arose of a mass of special uncorrelated learning with little basic education—the English tradition of the cultured gentleman did not die easily—and many schemes were thought out to produce a “well-rounded” education. Divisions of learning were stressed; humanities, social science, and natural science (again subdivided into biological and physical science) became fixed labels; and these must all be tasted by a so-called educated man, i.e., a holder of a B.A. or B.S. degree. With group requirements we combined so-called fields of concentration, majors or minors, that guaranteed an acceptable curriculum.

The old set curriculum implied a carefully charted course, which normally took four years; therefore we settled on four years also for our new pattern with the elective base. To determine what we constituted a “whole,” we settled for a norm of 15 hours a semester, 120 hours (on the semester plan; 180 under the quarter system) more or less for a bachelor's degree.

Of all the fairy tales in American educational history, the statement that 120 semester hours = 1 B.A. or B.S. is one of the most fantastic. In many ways it has been calamitous. Of course there were many safeguards taken and many a student received excellent and well-rounded training under the system. At Harvard, both under Eliot and after, I feel certain that the majority of the graduates had excellent training; but of the hundreds of imitators many lacked the ability or the fortitude to maintain unified control. Gradually with vast increase in enrollment, the huge migration of students from institution to institution with transfer of credits, the credit system came to dominate; we still seem to believe that 120 credits = education, that 120 bricks with or without mortar constitute a building—coherence even in arrangement becomes secondary.

A good education can be gained under this scheme; that I would be the last to deny. But it puts a premium on good guidance and competent advisers; if these exist, we find well-knit, unified programs and excellent results. The better the institution the more stress on the personal contact, the close cooperation of teacher and student. Such guidance is not (as supposed by many) limited to small institutions and the product of small enrollment. But in numerous colleges, under the strain of abnormal growth and expansion, there was more than an even chance that the graduate would come out with less than the ideal coordination of his work.

We move now to what I named as our third phase—the reaction against those features of the elective system that seemed most unpropitious. Experi-

mentation has been a dominant note in the last 50 years and numerous plans arose to modify our methods and aim at better results. One of the most significant experiments was Woodrow Wilson's introduction at Princeton of the preceptorial system. Small classes under the leadership of brilliant young preceptors proved an effective but costly method in raising standards—one that few colleges could afford to follow, though the plan has had a broad influence on various honor systems throughout the land.

One of the first and most noteworthy was the Experimental College at Wisconsin under Professor Meiklejohn, an educator of imagination and courage who had been president of Amherst. The college did away with almost all the trappings of credits and course units to study broadly various phases of civilization, ancient and modern.

The experiment did not last long in its original form, but its influence is still felt, and was undoubtedly an inspiration to the Hutchins experiment at Chicago.

A more general attack on our specialized training, and one more far-reaching, is that which still flourishes in the name of "General Education," a movement for broad, integrated courses on the junior college level, aimed at giving that knowledge of cultural and scientific fields that any competent, educated citizen should have. One of the early and most successful efforts was that at Columbia College under the leadership of Dean Carman. The system of basic training there established still characterized the fundamentally sound collegiate training for which Columbia is known.

More prominence and more publicity in the general education movement came with the Harvard study, *General Education in a Free Society*, published in 1945. This study became basic for curricular planning not only at Harvard but on hundreds of other campuses the country over.

My presentation is, I realize, an over-simplification; for many experimental curricula of great variety had sprung up at various colleges, all seeking to raise the level of college training and stressing most the importance of recapturing the better elements in the old liberal education. Of the older colleges, many had maintained much of the traditional work. Others new in the field, like Reed College and Rice Institute set out to establish institutions of high standards aiming at broad cultural training. Another interesting experiment was that carried on at Chicago under the leadership of Chancellor Hutchins. Again the lower division was devoted to general courses; but with this change came also a new experiment in integrating this part of higher education with that of the secondary schools. New division lines were established—senior high school and junior college were combined to form a new entity with the B.A. given at the end of what was commonly considered the sophomore year. Undoubtedly time was saved, and certainly also the general education was better integrated than usual in most other schools. The truncated college course was followed by a three-year period of specialization and concentration leading to the M.A. or M.S. degree. This too, made sense; for the old system of a junior-senior period with majors and minors often failed to prepare properly for the graduate work. Or, rather, the senior college might give a

good basic training in a major but the one-year graduate period leading to the master's degree (especially if done at a different institution) often did not properly top off the undergraduate course. More often than not it served merely as training in methodology prior to study for the doctorate.

To me, this plan was theoretically the best of the many experiments. Yet it failed, largely, I think, because Mr. Hutchins did not reckon with one of the greatest of all forces in American society—i.e., the demand for conformity. Hutchins realized the waste of time in much of our work, and he met the problem squarely. University and college admissions officers, however, refused to recognize the Chicago B.A. as anything but a terminal point in a junior college program. Finally the pressure for conformity won out, and Chicago is once more moving toward the popular degree (120 semester or 180 quarter hours = a B.A.), but Chicago's tradition for high standards will, I'm sure, guard against any dilution of the curricula.

That the movement toward integrated courses and well-rounded curricula had much of importance, I would be the last to deny. However, as all popular movements, this one too often smacked of faddism, too often seemed to play a game of "Follow-the-Leader." Deans and presidents came home from the inevitable conference determined not to be left behind in the race for conformity. Faculty committees and faculty workshops labored assiduously, and are still laboring, to bring their college "into line." Too often, the label is new but the actual offering is a scrambled version of the old—sometimes a little better, sometimes a bit worse. And the eggs are not always fresh. It reminds me a bit of the old story of the guest at a small hotel, who complained that his boiled eggs were not good. The head waiter replied, "Oh, I'm sorry; they must have given you the scrambling eggs."

A great advantage (from the president's point of view) is that the new system, if skillfully handled, costs less to operate. If students for two years are pretty much assigned to the same courses, a multiplicity of electives can be eliminated. One difficulty soon was apparent: the average teacher was not prepared to handle the new courses. For example, in "humanities," who could really give an adequate analysis of literary and philosophical development from the Upanishad to Untermeyer? The teachers, therefore, must be given "spot treatment," partly in departmental seminars and partly in summer workshops, to qualify them for the new task. This certainly was good for the teacher—if it worked; if it did not, the results could be awfully bad for the student. Too often teachers returned "indoctrinated," not re-educated.

By this time almost every college in the country has, to a certain degree, followed the modern trend. At the best, where the student gains control of one major field and has a good broad concept of several others, the modern training is definitely a step forward. At the worst, when the general courses become diluted survey courses, taken to avoid laboratory and other "nuisances," the new is a serious step back.

At this point we stand now; and most serious educators realize that many problems are still unsolved. Experiments will continue. One thing becomes more and more apparent—the good teacher is paramount and, if you have

him, any system can work. For the future this is a most serious problem, for with ever increasing enrollment and ever increasing shortage of teachers, heroic measures are essential.

Even this is not the most important of our educational problems; we are facing a crisis of real magnitude.

When the atomic bomb fell on Hiroshima, the world entered a new era. We have entered the Atomic Age; you cannot turn the clock back. Man has discovered and gained control of a force great enough to destroy the human race and the world in which we live. On the other hand, if properly controlled, the new knowledge may lead to a development and progress greater than we have ever dreamed.

If we turn to the study of the past, we find the records of the rise and fall of great cultures. In spite of intensive study man has never grown wise enough to diagnose the sickness of his culture and avert its fall.

We remember 490 and 480 B.C. not merely because of glorious victories of the Greeks at Salamis and Thermopylae. It means rather the salvation of Greek culture for the Western World, and the halting of Oriental advance for a thousand years. The victories made possible the age of Pericles, they may have saved for us the work of Plato and Aristotle, of Aeschylus and Sophocles, but the Greeks with all their art, all their learning, could not save their culture from deterioration and decay. The Romans took over; they borrowed the art and improved on the law and government. Their wealth and power grew, but their empire disintegrated under internal strife and the decay of morals, and under the external pressure of Barbarian hordes.

But 1945 seems to me even more significant than the turning points in past history. The power that is ours far exceeds anything in the past; it has suddenly come into the possession of man—woefully ill equipped to solve the problems that must follow. What will happen in the next years is impossible to predict.

When I contemplate our situation, I am reminded of the tale in *Arabian Nights* of the *Fisherman and the Djinn*. You remember how the fisherman, after hauling in his nets the great brass bottle, removed the seal of Solomon from the mouth. Immediately the Djinn as a vast vapor filled all space and gradually took form as a monster threatening death and destruction. The quick-witted fisherman charmed his enemy back in the bottle and slapped on once more the seal of Solomon that could dominate all spirits. Can we charm the power of nature back in the bottle or will it destroy the human race? Shall we learn to harness that power and move forward to a period of richness and development beyond anything in the past?

It seems to me those in power are woefully uncertain of how to move next. We emphasize weapons; only incidentally are our scientists allowed to concentrate on nuclear energy for the good of mankind—and basic scientific knowledge is still "classified."

We hear that the dangers of radioactive elements are minor; then again we have such obviously sincere and eloquent pleas as that of Schweitzer over the Oslo radio. And again Schweitzer's words to Norman Cousins: "Only a

few years ago, the statement that this planet could be made unfit for life seemed absurdly melodramatic. But there is no question any longer that such power now exists." And again: "... danger of this magnitude is not easily grasped by the human mind. As day after day passes, and as the sun continues to rise and set, the sheer regularity of nature seems to rule out such thoughts. But what we seem to forget is that, yes, the sun will continue to rise and set and the moon will continue to move across the skies, but mankind can create a situation in which the sun and moon can look down upon an earth that has been stripped of all life."

Never before was education so important. I mean not only for training in the "know-how" of the new forces and their use; that in itself demands a whole new approach to physics, chemistry, biology, and engineering. Education has an even more serious task of training man to understand and live with his fellows. The awful question that faces us is whether time will be granted to train a new generation before the old destroys the world. At present the force that may destroy us is made the shuttlecock of power politics in the world at large and of petty politics on the domestic stage. The dangers are largely ignored, and the public stands idly by and lets the politicians rage.

And what are the educators doing? Concerned with the rising tide of students, the growing shortage of staff, the inadequate facilities, they are struggling with the mechanics, with free or restricted admissions, tests for this and that, tuition and costs. These problems must be solved but they are only incidental. Our scientists are pushing, pushing for research and teaching in the new fields; the National Science Foundation is campaigning for training of men of science; one field is scouring the country for prospective men; the Ford Foundation multiplies the Woodrow Wilson fellowships to give us more teachers. The world is so excited and scrambled that no unity of plan comes out of it. The President sets up a Commission for discussion of education beyond the high school and Congress refuses the few dollars to support it.

Never before did we need so badly the sanity of the Greek plan (also that of the Renaissance) of training the "whole man." Education must return to an approach that is both intellectual and ethical. In our media of mass-communications (a phrase I cordially dislike) the whole approach to the problems of the day seems to me what we might call the "hostile approach." Newspapers, magazines, radio and television all stress the enmity of Russia, China, and all their satellites. I do not mean that we should play the ostrich in the face of danger; it is the special task of our government to watch our safety. But is the ethical ideal to be entirely forgotten? We talked bravely of "One World," of the "Four Freedoms," of our United Nations; we have fought the "wars to end all wars." Now we are afraid to talk of peace for fear someone will call us a communist or a fellow traveler.

Unless American higher education can help solve the question of living in this world, the problems of specialized or general, of elective or prescribed curricula become futile and unrewarding sophistry.

The Education of the Physician in the United States: The Current Scene

Medical Education in the United States: A Background Resume

EDWARD L. TURNER, M.D.*

IN THE COURSE of reaching its current development medical education in the United States has undergone three interesting phases, each of which has reflected the social, industrial and cultural aspects of the nation. Early medical education was largely of the apprenticeship-preceptor character, beginning in the period prior to the development of medical schools and of institutions of higher education. The first colonial physicians were usually clergymen¹ who had received instruction in both religion and medicine in England. The sole means of developing new physicians in such a setting was through apprenticeship under these physician-preceptors.

In the first chapter of his report on Medical Education in the United States and Canada, Flexner² stated that the youth of that early period who desired to become a physician, "was at an early age indentured to some reputable practitioner, to whom his service was successively menial, pharmaceutical, and professional: he ran his master's errands, washed the bottles, mixed the drugs, spread the plaster, and finally, as the stipulated term drew towards its close, actually took part in the daily practice of his preceptor,—bleeding his patients, pulling their teeth and obeying a hurried summons in the night." Such training obviously was of widely divergent quality, depending upon the capabilities and conscientiousness of the preceptor and the intelligence, ambition and industry of the apprentice.

As time went on some individuals, gaining their basic indoctrination in such fashion, desired to learn more and migrated to the medical centers in Europe and the British Isles. Stimulated and enthused by rewarding periods of study abroad some of these physicians began to establish medical teaching institutions initially centered in Philadelphia, New York and Massachusetts. These early schools did not replace the apprenticeship—preceptor medical education of the period but were designed to supplement it. In retrospect it is interesting to note that the first medical school established in the United States was associated with an institution of higher education and that it utilized the facilities of the first major public hospital in the country in the conduct of clinical instruction.³ This sound basic concept of a medical school

* Secretary, Council on Medical Education and Hospitals, American Medical Association.

as part of an institution of higher education and possessing good hospital facilities for clinical teaching was lost to a large degree during the 19th century.

The early history of the nation was associated with rapid expansion, a widely scattered population and with difficult problems of communication and transportation. Physicians were in demand to serve the widely scattered communities. The apprenticeship-preceptor training continued to flourish and reliable sources² record that early in the 19th century less than 10 per cent of the physicians in the country were graduates of medical schools and over 80 per cent of them had never even attended lectures in a medical school. The general level of medical practice was less than desirable and for a considerable period of time it tended to become worse rather than better. The "lusty continent building period" of the 19th century¹ was associated with the development of the proprietary medical school which characterized the second phase of medical education. Medical schools began to sprout almost anywhere and for a time it seemed that wherever a half dozen or more practitioners were located, potentialities existed for the creation of a new school. These institutions were private money making ventures with the faculty dividing the financial spoils and the prestige of academic titles.

Admission requirements emphasized ability to pay the necessary fees rather than background preparation. Rivalry between schools and between faculty personnel became intense and bitter. In the competition for students, educational standards became almost nonexistent. It is recorded that the wave of commercial exploitation which swept the profession in medical education was even reflected in the original university departments, where medical schools which had been integral units became relatively independent of the institution with which they were legally united. During the 30 years from 1810-40, 26 new medical schools were started and in the period from 1840-76, 47 more were initiated. Flexner³ reported that in slightly over a century 457 medical schools were chartered in the United States and Canada and that although some were short lived and others still-born, there were still 155 in existence at the time of his report in 1910.

Historical documentation of this phase of medical education indicates that it was literally chaotic. There continued to be some bright spots and ambitious physicians furthered their education in European medical centers. Gradually there developed increasing concern on the part of leading members of the medical profession over the status of medical education. The first major development occurred following the agitation initiated by Dr. Nathan S. Davis and resulted in the creation in 1846 of the American Medical Association. At that time the Association was committed to two propositions, namely "that young men received as students of medicine should have acquired suitable preliminary education" and "that a uniform elevated standard of requirement for the degree of M.D. should be adopted by all of the medical schools in the United States."² However, it was not until shortly before the turn of the 20th century that much substantial progress became

apparent.

The organization of the Johns Hopkins Medical School in Baltimore in 1893 witnessed the establishment of the first medical school in the United States of genuine university type, with endowment, laboratories, hospitals and a faculty dedicated to medical education and research. This event was the forerunner of the third and current phase of medical education. During this period which has been characterized by rapid advances in knowledge in all fields and ever greater expansion of science and industry as well as major social and economic adjustments, medical education has centered its development in the atmosphere and environment of the university.

If time permitted it would be of interest to review some of the facts that have played roles of major importance in determining the course of events that resulted in the revolution in medical education in the first decade of the 20th century and subsequent events that have taken place. Suffice it to state that the initial urges to improve the situation stemmed from leaders in the profession and leaders in education. The American Medical Association through its Council on Medical Education and through its Journal, the Association of American Medical Colleges, the Carnegie Foundation for the Advancement of Teaching, and Abraham Flexner's Report in 1910 were the primary factors in bringing about the circumstances that stimulated the events which have taken place in medical education in the United States since 1910. The rapid advances in scientific knowledge applicable to medicine have been associated with the need for constant study, re-evaluation and experimentation in medical education. The rise of specialization which has been a natural accompaniment of advancing knowledge has aided in solving some problems while at the same time creating others. Social and economic readjustments are occurring which have major impacts in all phases of life today and definitely involve medical education as well as medical care.

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The Education of a Physician in the United States: The Current Scene

EDWARD L. TURNER, M.D.

ONCE AN INDIVIDUAL has made the decision to seek a professional career in medicine, it is generally conceded that he has undertaken an educational program which will continue throughout his lifetime. This lifelong educational experience in the United States may be divided into four general periods, namely; (1) the premedical or period of preparation prior to admission to the medical school; (2) the four year undergraduate study within a medical school; (3) the graduate education and training characterized by the internship, residency and fellowship experiences; and (4) postgraduate or continuing medical education (See outline). Although no two patterns of premedical preparation or of undergraduate medical education may be identical, there are fundamental similarities less divergent than those of the graduate and postgraduate periods of education.

At the present time there are 78 approved four year medical schools in the United States. Thirty-nine are publicly owned and 43 are privately owned, although most of these latter receive considerable financial support from public resources. There are four 2 year schools of basic medical sciences, one of which is increasing its program to a full four-year medical course. There are three new 4-year schools in various stages of development, all of which will be graduating physicians within the next three years. During 1955-56 there were 28,748 students enrolled in the 83 approved medical schools with 6,845 physicians completing their undergraduate medical education in that academic year.

The "basic medical school operating budgets" of 82 medical schools during 1956-1957 was in excess of \$111 million. In addition, these institutions received over \$58 million in research grants and approximately \$9 million in teaching grants from outside sources for a total in excess of \$178 million. Approximately 18 per cent of the basic budget is derived from student tuition while the remainder is obtained from government appropriations, endowment income, general university funds or gifts and grants from various sources. Although many of the medical schools have outstandingly fine teaching and research facilities, a number of them are sorely pressed for adequate teaching quarters and major augmentation of research space. In other words, the rapid advances in scientific knowledge necessitate constant reorientation in teaching and increased activity in research both of which areas necessitate augmentation of personnel, facilities, equipment and the increased financing needed to realize such readjustments.

At the present time medical schools admit, on the national average, approximately one out of every two applicants. The actual ratio of applicants to admissions varies greatly with different institutions. Some of the older

and traditionally excellent institutions have many times the number of applicants received by other institutions. Some of the tax-supported public institutions confront residence restrictions concerning admission to the school which tends to limit applications. Premedical students apply on the average to three or four medical schools, although this too tends to vary in certain geographic areas.

In selecting medical students, admissions committees have as a genuine challenge the evaluation of the college preparatory phase of premedical education and the determination as to whether it has adequately prepared the candidate for the study of medicine. Although a limited number of medical schools require that acceptable students complete a bachelor's degree prior to admission, most schools have a minimum requirement of three years of premedical education in an institution of higher education accredited by its appropriate regional agency. Most admissions committees have learned that there is no procedure or group of procedures that is uniformly successful in the selection of desirable medical school candidates. There is general agreement that the single best index is the academic accomplishment of the applicant and that this, used in conjunction with other "tools and technics," accomplishes about as effective selection as has been devised to date. The other "tools and technics" include such factors as: (1) the Medical College Admission Test; (2) recommendations from science and non-science teachers; (3) personal interviews; (4) evaluation of personal history essays; (5) psychological testing; etc.

In general, medical school admissions committees are searching for individuals who have demonstrated evidence of academic ability and accomplishment, who have had not only sound indoctrination in the sciences essential to the study of medicine today, but also educational experience in the humanities giving reasonable breadth of perspective. They are searching for individuals who have demonstrated those personal qualities of honesty, integrity, industry and ability which should furnish solid character foundation for a field such as medicine. It is fully recognized that there are many intangibles which cannot be measured and that can at best be the basis of impressions which may or may not be borne out later on. Because of the limited openings available, it is important that candidates accepted for admission be individuals who give evidence of ability to meet the challenge of the heavy academic schedule confronting them in medical school.

Although the means of achieving them vary widely in the different medical schools, there is general agreement as to the objectives of undergraduate medical education today. Much careful thought and study has been given to analyzing the objectives of medical education in its current setting and in 1953, following at least eight revisions, the Association of American Medical Colleges presented a statement portraying its current position. This statement clearly presents the concept that the four years of undergraduate medical education "must provide a *solid foundation* for the future physician's development." In other words, it should provide the educational opportunity for the development of the *undifferentiated physician* through making it

possible to *learn fundamental principles*, "applicable to the whole body of medical knowledge, *establish habits of reasoned and critical judgment of evidence and experience*, and *develop an ability to use these principles and judgments wisely* in solving problems of health and disease." In the present state of scientific knowledge and development this period clearly cannot present the educational opportunity for complete, detailed, systematic knowledge concerning each and every medical and related discipline.

To achieve this *solid foundation* it is felt that the educational program must at all stages involve the student in an active role faced with adequate and constant incentives conducive to learning. Such situations necessitate definite day-to-day and gradually upgraded responsibility under guidance and supervision of competent faculty personnel. Medical schools, therefore have the serious responsibility of endeavoring to assist the student in:

- (1) the acquisition of basic professional knowledge
- (2) the establishment of essential habits
- (3) the attainment of clinical and social skills essential to the utilization of professional knowledge
- (4) the development of those basic intellectual attitudes and ethical or moral principles which are essential if he is to gain and maintain the confidence and trust of those whom he treats, the respect of those with whom he works and the support of the community in which he lives

It is clearly recognized that *these objectives are mutually interdependent* and that they only "summarize the desirable characteristics of the responsible professional person medical education is attempting to produce."

Medical education is constantly undergoing transformation. The advent of the laboratory shortly before the turn of the century increased active participation by students, but much of medical education remained didactic in some institutions until relatively recent times. Although there is unquestionably a place for the lecture when it is well prepared and designed to stimulate thought and study rather than basic "spoon feeding," it is true that much of the earlier didactic teaching was oriented solely toward passive student participation. During recent years the allocation of time devoted to conferences, seminars and other small group teaching activities has increased while time allocated primarily to formal lectures has decreased. In the upper two years of the undergraduate medical curriculum this change has been especially noticeable with the development of the modern clinical clerkship and the virtual elimination of a large amount of formal lecturing.

As currently constituted most medical schools conduct instruction in anatomy, biochemistry and physiology during the first year. The actual manner in which these three major areas are studied varies with the resources, facilities, personnel and imagination of departmental and medical school leadership. In some institutions these departments remain isolated, pigeon-holed areas with little knowledge or concern as to their relationship with other departments or with the school as a whole. In recent years, however, there has been increasing concern over the fragmentation that crept into medical education as well as into the field of medical practice as specialization continued its advance. It has gradually been recognized that structure and

function are interdependent and that neither can be fully appreciated or well understood without knowledge of the other. Thus over the past two decades there has been an increasing tendency on the part of medical faculties and imaginative departmental leaders to devise ways and means whereby the artificial barriers that have isolated and fragmented can be overcome.

Efforts at correlation have been made within individual departments of anatomy. Where gross anatomy, histology, embryology and neurology were formerly separate isolated entities, programs to correlate and integrate all four phases have been developed in a number of institutions. Entities such as neuroanatomy and neurophysiology are now coordinated and taught simultaneously in some schools with the resulting impression of necessitating less total time while developing a more comprehensive understanding of both structure and function of the nervous system. Biochemistry, physiology, certain aspects of histo-chemistry in both anatomy and pathology, pharmacology, microbiology and pathology all offer fascinating opportunities for interdepartmental teaching, and constantly increasing thought and action is being directed towards such potentialities by imaginative leadership.

Such efforts at overcoming unnatural inter-departmental barriers have, at least partially, resulted from the development of the new disciplines of preventive medicine and psychiatry. Whether the idea is acceptable or not to many traditionalists, it must be recognized that until these two disciplines became an integral part of medical education, there was increasing emphasis on diseases and on parts of people, rather than on patients as fellow human beings. As important as sound science is to medical diagnosis and care, as well as to the prevention of disease, as these two disciplines matured it became increasingly obvious that it was important to introduce the concept of the human being in his total setting as early in the medical educational program as possible. Thus in most medical schools today there are introductory courses in the first year that emphasize the fact that all of this study is eventually directed towards patients whose problems involve not only organic disease, *per se*, but also the reflections of the socio-economic setting within which they live and work. Because these infiltrate into all areas of medical knowledge and care the two disciplines of preventive medicine and psychiatry have, indirectly, played an interesting and influential role in focusing attention on the need for and advantages of imaginative and constructive integration and correlation of many facets of medical education.

The second year in most medical schools in the United States includes the study of microbiology, pharmacology, pathology and the beginning of direct patient contact in the introduction to history taking and physical diagnosis. It usually includes the introductory phase of applied basic medical science through the teaching of laboratory diagnosis. If preventive medicine and psychiatry have not already been introduced in the first year they may be initiated during the second year. In many institutions short introductory courses in other major clinical fields are given during the latter part of the second year. The introductory course in physical diagnosis in an increasing

number of medical schools offers an opportunity for interdepartmental participation. Clinical laboratory diagnosis offers a similar opportunity for interdepartmental collaboration between basic science and clinical departments that is utilized by an increasing number of institutions.

Besides the trend toward reduction in lectures, increased conferences, seminars and other types of small group instruction and increasing interdepartmental cooperation, there have been two other noteworthy developments in the program of the first two years in most institutions. These include the deliberate planning for free time in the student's schedule and the introduction of elective offerings. Although a few schools had offered schedules with some free time and electives prior to recent years, most institutions offered crowded curriculum programs with all time allocated to required assignments. The self-evaluation by faculties which has resulted in freeing curriculum time and developing attractive elective offerings has resulted in better organized teaching and has also stimulated the research instinct and imagination of some students who otherwise might have been unable to develop this interest.

Until relatively recent times there was a fairly distinct dividing line between the first two years which were commonly known as "preclinical" and the final two or "clinical" years. As more and more physicians graduated who were well grounded in the basic sciences of the first two years and who more adequately appreciated their application to the diagnosis and treatment of disease, the artificial division between the first two and the last two years of undergraduate medical education began to fade. For the past two decades most medical educators have utilized the concept of "basic medical science" rather than "preclinical" in their thinking and action. Today all well versed clinicians utilize this concept in their own daily activities, for sound clinical medicine cannot be possible without constant utilization of applied basic medical science.

The most significant change in the last two years of undergraduate medical education has been the development of the modern clinical clerkship. This has been designed to permit the student to spend the maximum amount of time in working with patients and in permitting him freedom to adequately study the cases to which he is assigned. This has necessitated that "block" assignments of curriculum time be allocated so that the student may have continuity of opportunity to carry out such studies. Previously, in most institutions, and still in some, the clinical years were filled with assigned lectures and classes that largely involved passive reception by the student, rather than active participation. Most third year programs now involve one or possibly two lecture sessions daily for the entire class with the remainder of the day allocated to "block" assignments on "In-patients" services. In his case assignments the third year student becomes the junior member of the medical team, taking histories, performing physical examinations and undertaking certain laboratory procedures all of which become part of the official record. Supervision is direct and is through the intern, resident, other instruc-

tors and responsible staff personnel. Rotation is scheduled so that approximately one-third of the year is allocated to medicine, a second third to surgery and the remainder divided between obstetrics-gynecology and pediatrics. Other specialty areas are encountered in the course of consultation activities, conferences, ward rounds and discussion.

The period between the third and fourth years has narrowed almost to the vanishing point in some medical schools. Others still adhere to essentially a normal academic pattern. Many schools have included free time and electives in the third year. Preceptorships in general practice are offered either as electives or requirements in about two dozen medical schools after completion of the third year.

The fourth year is a continuation of the clinical clerkship with assignments primarily in the out-patient clinics, although on some services there may be a combination of both in-patient and out-patient work. Assigned lecture hours in the fourth year are minimal. If instruction in the subspecialty and minor specialty areas has not been offered during the third year a few hours may be devoted to the more important aspects of them during the senior year. Assignments in the clinics and on the wards in the fourth year are arranged in "block" form with rotation of the students through medicine and medical specialties, surgery and surgical specialties, obstetrics-gynecology, pediatrics and, in some instances, specific assignments to psychiatry, preventive medicine or an elective period. Instruction is usually offered in legal medicine during the third or fourth year. Medical ethics, socio-economic aspects of medicine and medical history may be presented as separate courses or through the medium of material incorporated into one or more other areas of instruction. A few medical schools require a student to prepare and present an acceptable thesis prior to graduation. Others have a thesis as an elective, but the majority have no thesis requirement.

Prior to the development of the problems associated with deferment from military service, some interested students would "drop out" for a year or two between the first and second, or second and third year to undertake research or to act as teaching assistants. The Selective Service policies regarding deferment during the period of World War II and subsequently largely discouraged such student "drop out" periods. The development of free time periods during the academic year and of summer research scholarships has again made it possible for increasing numbers of students to undertake research activities during such periods.

Methods of student evaluation in undergraduate medical education vary widely. Such matters are determined by many factors such as the size of the student body, the size of the faculty as well as the basic philosophy of the faculty and its administrative leadership. Each institution endeavors to graduate individuals who have satisfactorily met their criteria and who, as young physicians, will be prepared to assume the responsibilities accompanying an internship appointment. *At this point the medical school has hoped to produce the undifferentiated physician whose basic foundation is sound*

and who can subsequently, through internship, residency and or fellowship experiences erect the edifice of general or specialty knowledge essential to medical practice in the area of his choice. Schools also hope that in their efforts to achieve this end that these young physicians will have seen and been stimulated by the great research needs and opportunities that present themselves in every area of medicine and that some of them will seek careers in and contribute to the advance of knowledge.

Although the program of undergraduate medical education as presented fairly typifies the current general pattern, there is much unrest and increasing experimentation as medical faculties and their curriculum planning committees in the United States search for better ways and means of achieving desired objectives in this field. These studies and experiments vary from minor realignments of departmental activities and curriculum content, to complete reorientation of the entire program of undergraduate medical education, such as has taken place at Western Reserve University during recent years. The changes in medical education at Western Reserve University were instituted only after several years of exceedingly careful preliminary study and planning by the faculty and its progress has been observed with great interest. In this experiment the faculty has "concentrated attention on the processes of education and on efforts to develop appropriate attitudes and motivation in the students, as well as an integrated knowledge of body structure and function." In the pursuit of this program the Western Reserve University faculty has developed the philosophy "that the medical student is in fact a graduate student capable of increasing responsibility for his own education"—and a human being as entitled to treatment as a whole person, studying in an atmosphere conducive to the development of constructive attitudes and motivation, as well as providing guidance in the selection and pursuit of long range objectives and in the acquisition of facts and techniques.

The faculty and administration at Johns Hopkins University School of Medicine have, after careful study, concluded that the fundamental defects in American medical education primarily concern (1) an undesirably long curriculum, (2) an "iron curtain" between the liberal arts and medical sciences, and (3) a decline of faculty strength in the basic medical sciences. They propose to integrate certain facets of liberal arts and medical school education on the one hand and medical school hospital education and training on the other hand. This plan, if put into action will shorten the course of training of physicians by two years and thereby also reduce the total cost of medical education. The proponents of the plan believe that it will liberalize medical education through closer collaboration between the medical school and other disciplines within the university. Certain duplications of effort would be avoided and it is felt that academic standards of premedical courses in the natural sciences might be raised. Among other factors "it should automatically provide an effective rotating internship in the Johns Hopkins Hospital for every senior student in the Johns Hopkins Medical School."

Experimental programs such as those of Western Reserve University and Johns Hopkins Medical Schools will be followed with interest. Certain facets of such programs may ultimately be adopted by other institutions and undoubtedly many equally intriguing educational experiments will be devised and activated by other imaginative medical faculty groups. This unrest, this constant dissatisfaction with current progress, this constant search for better tools, technics and methodologies typifies American medical education today and offers ever greater promise for the future.

Although internships had existed prior to the turn of the century, it is only during the past 45 years that they have developed to the point where such an experience constitutes one of the recognized links in the process of education of the physician. Only about half of the states include an internship as a basic requirement of a candidate for licensure but during the past two and a half decades practically all medical school graduates have sought such additional education and training experiences. At one time as many as 15 medical schools included a year of internship after completion of the four-year medical course as a requirement for their medical degrees. With the marked changes and improvements in the third and fourth year clinical clerkship in most schools, and with the increasing dissatisfaction over some of the internships, this requirement of the internship prior to granting the medical degree has been discontinued. While this requirement was in effect it was necessary that the internship be served in an institution acceptable to the medical school from which the degree was being obtained.

The Council on Medical Education and Hospitals of the American Medical Association began listing hospitals offering internships approximately 45 years ago and since then, has endeavored to annually prepare a list of institutions which met its criteria for approval of such programs. As of September 1, 1956, 862 hospitals in the United States offered 12,013 internship appointment opportunities. Between graduates of American medical schools and those of foreign medical schools over three-fourths of the available internship positions have been filled during recent years. In 1953, 78 per cent were filled; in 1954, 82 per cent and in 1955, 83 per cent of available internships were filled. When first designed the internship actually provided the medical graduate's first genuine patient contact and responsibility. Today this is not the case, nor, in most instances, does it represent the final stage of preparation prior to private practice. As has been indicated the improved clinical clerkship has included much of the significance of the internship and the growth of knowledge has necessitated additional education and training for either general practice or for specialization. Thus the internship today is one of a series of graded steps towards the assumption of total responsibility for patient care.

Today internships are classified as: (a) rotating, (b) mixed or (c) straight. About 10 per cent of the approved internships currently offered are straight services in either internal medicine, surgery, pediatrics, obstetrics-gynecology or pathology. Only 1 per cent are classified as mixed, and approximately

89 per cent offer rotating experiences. A very careful study of internships by an outstanding and objective committee a few years ago, resulted in a report that the internship should be retained as a part of medical education and that the most desirable type of internship is a well designed rotating experience. Within the medical profession there has been a growing body of opinion that favors a rotating internship and that has recommended these be promoted rather than straight internships. On the other hand, in teaching hospitals there is strong support for straight internships and increasing opposition to the suggestion that internships should be developed according to a stereotyped concept of any kind. This controversy will undoubtedly continue until the internship is either discontinued or the whole area of graduate education modified to bring straight internships into the junior residency category in specialty training. The course of events during the next few years will determine whether the internship merits continuation as part of medical education, or whether it has become an anachronism.

Residency and fellowship education and training has been a natural accompaniment of specialization. In fact, the residency as early defined by the Johns Hopkins group indicated it to be the experience sought by the young physician who desires to further perfect himself in some special field of medicine. The development of the specialty boards and the basic requirements outlined by them for eligibility to examination for certification has played a great role in the various programs of residency training. Great impetus to residency and fellowship experiences was given by the various armed services, the Veterans Administration and other activities through their recognition of specialty certification and the differentials awarded to those possessing such certification. At any rate, today increasing numbers of young physicians seek graduate educational experiences of from two to four or even five years beyond the internship in preparation for specialty board eligibility.

Currently there are over 1,200 hospitals offering residency and fellowship education opportunities for approximately 28,000 individuals. Residency programs are evaluated by residency review or conference committees composed of representatives of the Council on Medical Education and Hospitals of the American Medical Association and representatives of the specialty boards plus, in certain instances, representatives from specialty colleges such as the American College of Surgeons and the American College of Physicians. These committees play an important role in determining whether or not residency opportunities and supervision are adequate, and whether the graduate experience offers the type of upgraded responsibility essential to eventual assumption of full responsibility by the trainee. These committees have aided in the development of general agreement within any given specialty area of the type of graduate educational experience deemed essential. In this area there is again not complete unanimity of opinion as to the role of specialization in relation to the general practice of medicine. There is also concern over what should constitute adequate preparation for the gen-

eral practice of medicine in terms of the needs of 1957 and for the period ahead. Trends in recent years have definitely indicated a constantly increasing tendency for young physicians to turn toward some specialty area rather than to enter into or remain indefinitely in the field of general practice of medicine.

At the present time there are examining and certifying boards in 19 specialties. Several of these boards in turn evaluate candidates for special certification or certification in sub-specialties. The primary purposes of the specialty boards are: (1) to conduct investigations and to determine the competence of voluntary candidates for certificates issued by the respective boards, (2) to grant and issue certificates of qualification to candidates successful in demonstrating their proficiency, (3) to stimulate the development of adequate training facilities, (4) to aid in evaluating residencies and fellowships under consideration by the Council on Medical Education and Hospitals of the American Medical Association, and (5) to advise physicians desiring certification as to the course of study and training to be pursued.

It is obvious from the above statement that the American Specialty Boards have become increasingly important factors in determining the type of graduate study to be followed, the facilities and supervising personnel considered to be essential and the time factors involved in attaining eligibility for consideration as a candidate for examination. There is need for continuous and careful evaluation of this whole area of preparation for specialization and the role of the specialty boards in order to avoid over rigidity and the increasing fragmentation which they tend to foster. This type of development can function as a "two edged sword" unless it is conscientiously and carefully directed with its objective being the best possible patient care rather than the vested interest of any particular professional group.

Postgraduate or continuing medical education becomes ever more important as factual knowledge of the prevention, mechanism, diagnosis and treatment of disease increases. Vital new discoveries are of little immediate use against human diseases until physicians in practice learn to effectively utilize them. The communication to physicians of significant aspects of this accelerating pace of medical discovery constitutes one of the great challenges of modern medical education. Actually the basic problems facing postgraduate medical education today are not too different from those that confronted medical schools around 1910 and that later confronted graduate medical education. There are many ways in which a physician can continue his educational experiences. Postgraduate courses constitute only one of the methods but they are, in actuality, perhaps the single most effective procedure when carefully planned and conducted.

Medical schools, hospitals, medical societies and specialty organizations all participate in the planning, development and presentation of various types of postgraduate courses at the present time. Some of these are short "refresher type" presentations, while others are longer and designed to be

primarily "additive" in nature rather than "refresher." During 1955-1956 there were 886 postgraduate medical courses held in the United States and attended by over 37,000 physicians. More and more medical schools are endeavoring to obtain the financing, facilities and personnel needed to develop postgraduate medical education activities designed to meet the ever mounting needs in this field. It is an activity that can be met only through very careful analysis of actual needs, based on realistic appraisal of medical knowledge as evidenced by practice in any given area. It can be met effectively only through cooperative planning on the part of those who conduct the courses with those who are to receive instruction. Without such constructive analysis and planning postgraduate programs might be tragic losses of time and effort for all concerned while with it such activities can reap great dividends in improved medical care.

Summary

In this paper the author has endeavored to portray the background and general development as well as the current status of medical education in the United States. Once the decision has been made to undertake a professional career in medicine an individual encounters four general phases or periods in the life-long educational experience ahead of him. These include the preparatory or premedical period, the undergraduate experience in medical school, graduate education during internship, residency and fellowship training, and postgraduate or continuing education while in practice. Each of these areas has been briefly discussed in the effort to give the reader a broad picture of the total scene in the field of medical education in this country today.

OUTLINE

MEDICAL EDUCATION IN THE UNITED STATES

(Once initiated, a continuing "life-long" venture)

- I Preparation—The Premedical Experience—3 to 4 years of college
Adequate education in the sciences basic to the study of medicine and a broad general education
- II Undergraduate Medical Education—4 years
Objective: To offer an opportunity to develop a sound fundamental knowledge in which to build competency in general medicine or in a limited specialty.

The Curriculum

1st year	Anatomy	Introductory correlation, growth and development, introductory psychiatry, socio-economic considerations, etc.
	Biochemistry	Free time—electives
	Physiology	Research?
	Microbiology	Further correlation
	Pharmacology	Initial clinical contacts in hospitals and clinics

2nd year	Pathology	Free time—electives
	Physical Diagnosis Laboratory Diagnosis	Research?
3rd year	3rd year clerkship	Decreased emphasis on lecture Block assignments
	Medicine	In-patient clerkship Junior member of medical care team
	Surgery	History physicals, laboratory
	Obstetrics-Gynecology	Psychiatry, radiology
		Public Health and other specialties through consultations, conference, CPC etc.
		Free time—electives
		Research?
4th year	4th year clerkship	Minimum didactic
	Medicine and Med. Spec.	Usually outpatient block assignment
	Surgery and Surg. Spec.	Lectures and Clinics in minor specialties
	Obstetrics-Gynecology	Possible preceptorship
	Pediatrics	Free time—electives
	Psychiatry	Radiology
	Public Health	Anaesthesiology etc.
	Legal Medicine	Research?
	Ethics	
	Economics	
	History	

III—Graduate Medical Education

1 to 5 years

The Internship	Rotating Mixed Straight	1 year experience between graduation and residency training or military service
The Residency of Fellowship	Residency training currently offered in 28 categories Periods of 1 year to 4 years depending on facilities and personnel of institutions and requirements of various specialty boards for certification	

IV Postgraduate Medical Education

From completion of graduate medical education and training to cessation of practice.

Professional literature—books, monographs, periodicals.

Professional contacts—between physician and his colleagues.

Hospital Staff meetings—Staff conferences, C.P.C.,
radiological conferences, Journal Club, etc.

Professional Society meetings—Local, state, national,
general or special medical society meetings.

Postgraduate courses—attendance at formal course offerings.

Evaluation of the Applicant for Medical Education

ROBERT J. GLASER, M.D.*

THE PHENOMENAL DEVELOPMENT which has characterized medical education in the United States in the past half century has resulted in an ever sharpened focus on the central figure of medical education—the student. At the time of the famous report by Abraham Flexner in 1910—probably the most important single factor in the advance in medical education in this country—little if any attention was given to the question of student selection except at a very few schools whose applicant groups outnumbered the available places in their entering classes. Indeed, so few young men and women graduated from high school that even this much educational experience was thought to represent too much of a demand! And yet, in less than 10 years after Flexner's study was published, all the approved medical schools had increased admission requirements to include at least two years of college. Concomitantly there occurred a tremendous increase in the number of high school and college graduates; in the past 40 years the former group has increased almost tenfold and the latter more than tenfold. About 30 years ago, the *total* number of applicants applying for admission to the medical schools of this country finally exceeded the *total* number of available places, and in 1939 all schools had reached the point where applicants outnumbered available places. Thus, despite an increase in the number of approved schools and an increase in the absolute number of students accepted, the percentage of acceptances offered by the schools fell from a high of 62.2 per cent in 1933 to 28.8 per cent in 1948. This very low figure reflects a transient but marked increase in the applicant group resulting from the large number of returning World War II veterans interested in medicine. Gradually the ratio between applicants to acceptances fell, and in the past year, approximately 50 per cent of those who attempted to enter one of the 82 medical schools in the United States were successful.

The necessity of selecting from an applicant group larger than could be accommodated was one factor which obviously focussed attention on the

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selection process. But several others were also involved. As the requirements for the premedical phase of the student's education increased on the one hand, and the complexity and length of the medical curriculum were extended on the other, it became apparent that only young men and women of superior ability could be expected to meet the demands imposed on them. Further, from the practical point of view, since each student's education is only partially covered by his payment of tuition, the medical school has a financial investment in each student. More important, however, is the consideration that when a student, for whatever reason, fails to complete the medical curriculum, one less doctor is available for future service to the people of this country. Likewise, the admission of an incompetent candidate and the possible exclusion thereby of a competent one is most serious.

There has thus grown up in this country, in the past 25 years especially, a realization of the importance of the selection of students for medicine, and keen interest in the techniques of selection has been manifest. Whereas it must be emphasized that our skills in selection still leave much to be desired, we have learned much in this important and challenging field. It will be my purpose to review our current approach. At the outset it must be emphasized that among the 82 schools in the United States, there exist important differences in the admissions problems. For example, in general the privately supported schools deal with much larger applicant groups than do those schools deriving their major financial support from state or municipal government. In the latter schools there are usually imposed, to a lesser or greater degree, geographic restrictions which *per se* exclude many prospective applicants. This kind of restriction has deleterious effects on the selection process, especially for the schools in less populous areas with relatively few students in their applicant group. Nonetheless, all schools in the United States now seriously concern themselves with the admissions process, and although the actual methods employed by the schools vary, certain general principles apply.

The Mechanics of the Admission Process

Although the selection process is by no means perfect, it has been improved over the years by the fact that interested persons have given much time and thought to it, and have arrived at valuable operating guides. For example, it is well recognized that the selection process cannot be haphazardly assigned to members of the faculty. Rather, as a most important facet of the medical school's activity, it must be assigned to a competent committee under the leadership of an experienced faculty member. Most often the latter is a member of the dean's office staff, and there is much to be said for this vital task being placed under the aegis of that member of the dean's office whose major responsibility lies with the students. The size of admission's committees varies; they tend to be larger in those schools with very large applicant groups. Very large committees, however, are apt to become unwieldy, and in the last analysis it is the chairman who must carry the major role. In view of the great importance and responsibility of the

admissions committee, much is to be said for exposing members of the faculty to a term of service. On the other hand, experience accrued over a period of years is invaluable to the member of an admissions committee, and there is an obvious loss to the effectiveness of committee function if rotation of personnel occurs too frequently; i.e., just as the given committee member reaches the point where service has rendered his judgment especially effective. If membership on the admissions committee is to be rotated among the faculty, the rotation should be staggered so that the committee always includes experienced members.

Proper exercise of the selection process involves much time so that committee members should undertake the assignment only after considering the magnitude of the demand. At the same time such service should be recognized as an important academic contribution, of the same order as that made by able teachers. Much is to be said for representation on the admissions committee of both pre-clinical and clinical teachers. Since the ultimate aim of the admissions committee should be to select a competent group of scholars who will stimulate each other while pursuing their medical course, avoidance of too much homogeneity is in order. As long as those admitted have the requisite intellectual superiority excessive uniformity is not only unnecessary but unwise.

In the evaluation of applicants, it is essential that as much data bearing on all aspects of the candidate's qualifications be obtained as possible. In addition to the vital statistics as to the applicant's birth place, residence, age and marital status, information regarding his family background, previous education and performance, the nature of his nonscientific interests, his health record, and his work experience, if any, are important in gaining a general picture of the applicant.

Complete reports on the scholastic achievement in his premedical career are obtained from the undergraduate college or colleges. Recommendations from the student's college instructors also are gotten, and much is to be said for asking for appraisals not only from science instructors but from non-science instructors as well.

In addition to the foregoing data, obtained directly from the applicant or from his college, it is now almost a universal requirement in the United States that students desiring to enter medical school should take the Medical College Admission Test, an objective test administered by the Educational Testing Service. The test measures four parameters of the applicant's qualifications—verbal ability, quantitative ability, knowledge of modern society and science achievement.

There is now also increasing interest in the use of certain psychologic tests such as the Strong interest blank, the Minnesota Multiphasic Personality Inventory (MMPI), the Allport-Vernon-Lindsey Study of Values, and the Edwards Personal Preference Schedule among others. This group is representative of the objective tests available; also being used in some schools are certain projective tests, especially the Rohrschach Ink-Blot Method and the Thematic Apperception Test.

One of the instruments most widely used in the evaluation of the applicant for medical education in the United States is the personal interview. Some schools require that *all* applicants being seriously considered for admission have an interview, and most schools prefer to interview candidates. In some instances, where distances prevent candidates coming for interviews, schools either send a member of the admission's committee to carry out the interview or designate regional representatives to do so.

Evaluation of Students in the Selection of Students for Medical School, General Background

Since, as pointed out previously, excessive homogeneity in a given medical school class is not desirable, certain attributes should be looked for by admissions committees. Obviously integrity and honesty are essential. Although each of these traits is desirable throughout society's members, in no segment is each more of a *sine qua non* than in the physician, and these qualities are either present or absent. Unlike the case with some others, there can be no spectrum. In this regard, I am reminded of a recommendation form used by one of the large universities of the country on which various attributes of the candidate were graded on a scale with A the highest. I was perplexed by a grade of B in the *honesty* category, and wrote the faculty member concerned to indicate my strong belief that honesty could only be graded A or E—reiterating the fact that there can be no middle ground here. I was reassured to receive from him a prompt (and I might add an embarrassed) reply agreeing heartily and acknowledging carelessness on his part. He had no question of the student's honesty, but in the press of completing a large number of forms had failed to review his evaluation.

In the past 25 years, more attention has been given to the importance of attracting well-rounded—i.e., broadly educated—students into medicine. The desirability of having students complete four years of college work prior to embarking on medicine achieved much support—it was and is believed by many that a diverse educational experience in college, encompassing both the curricular and extracurricular areas, contributes significantly to the maturity of the premedical student and makes him better fitted for his chosen profession. Certainly the ability to accept and comprehend the complex responsibilities of the physician requires the kind of broad perspective and keen understanding which comes only with emotional and intellectual growth—and these in turn depend both on time and, to apply a microbiologic term—a proper culture medium.

It would be unreasonable to suppose that all colleges give their students the same kind of maturing experience in four years, or indeed, that within any college all the students gain comparable backgrounds. In all facets of our society, as in all chemical reactions, the substrate itself is of vital importance. Nonetheless, given an interested and industrious student it seems clear that a four year college experience will contribute to his growth and development.

As a digression from the mainstream, but of pertinence to this immediate topic, it is of interest that in a number of medical schools, various plans have been put forth to shorten the number of years involved in the process of premedical and medical education. Even during the period when most schools strongly advised applicants to obtain an undergraduate degree, almost all were willing to accept especially able candidates after three years of college, and some schools actually admitted a significant proportion of their classes from this group.

Recently, the increasing cost of medical education, the tendency of more and more medical graduates to pursue residency training for a longer period and the decrease in the total number of applicants for places in the medical schools the country over have stimulated the development of plans whereby the formal educational period is shortened. In some cases this objective has been achieved by the setting up of a program in which advanced science courses, combining both pre-medical and medical aspects, are introduced earlier than has been traditional, and concomitantly, liberal arts courses are continued into or even through the entire medical school portion of the program.

It is not the purpose of my discussion to evaluate these new trends, but perhaps I may be permitted to make one or two comments. Whereas few would argue with the basic desirability of decreasing the time and money now involved in a first class medical education, the fact remains that the body of knowledge has been increasing at such a rate that it is difficult to conserve time except by cutting down on the premedical portion of the educational period, and indeed this is the area cut in most of the newer programs. Whether the young men and women entering medicine after this abbreviated college experience will be able to handle the demands of the medical school curriculum remains a question—one certainly worthy of investigation. My own greatest doubt has to do with the question of whether successful selection of applicants for admission to medicine during their second year of college will prove feasible. Knowing from my own past experience as chairman of an admissions committee the magnitude of the task of selecting successfully a medical school class from college seniors, I have certain reservations about being able to do as well with sophomores. Since an admissions committee should assume that its job is to make no mistakes in selection—an impossibility in fact—the margin of error might well be higher the earlier final judgment has to be made. It must, however, be acknowledged that a number of thoughtful, experienced medical educators do not share this concern.

Unfortunately the medical schools—or at least many of them—have thwarted to some extent the broadening process of college by imposing an excessive list of requirements in science. These requirements differ from one school to another, and most students, recognizing the need of making multiple applications find it necessary to spend an excessive portion of their college days in meeting the patchwork of science requirements to the detriment of their general education.

In this regard it is rather discouraging to find how often students, applying for admission to medical school, when asked to name the last novel they read, acquire a puzzled expression and search painfully for an answer. Needless to say, such students, once they gain entry to medical school—and many do—cannot be expected to make themselves aware of what goes on outside medicine.¹

Students who in college, have participated in extracurricular pursuits—athletics, dramatics, journalism, etc.—and especially those who have had active roles, learn to use their time effectively, and assuming that they have demonstrated adequate intellectual competence, often do quite well in medical school.

Such general attributes as reliability, sense of responsibility, tolerance, warmth of manner and seriousness of purpose are clearly desirable as applicants to medical school. On the other hand, all are difficult to measure, and often admissions committees lack adequate criteria on which to form judgments in these areas. As will be discussed subsequently, research along these lines is now being actively pursued and can be expected ultimately to afford valuable information regarding the objective measurement of these attributes.

Importance of Grades

The 1956 Teaching Institute of the Association of American Medical Colleges was devoted to the subject which I am discussing.² At the initial session, evaluation of the intellectual characteristics of the applicant was considered and the importance of grades examined. There seems little doubt but what admissions committees in this country place more emphasis on grades than on any other single factor in appraising the intellectual capacity of the applicant. Both the overall grade average as well as grades in the sciences (particularly chemistry and physics) are considered of predictive value. Having made this statement it is necessary to call attention to a number of problems:

1. *How can grades from different colleges be equated?* For example, a given school may attract applicants from as many as 75 or 100 colleges in different parts of the country. Obviously the caliber of student bodies varies enormously, and consequently a given grade may mean one thing at X college and something else at Y college. No concrete answer to this important problem can be given, although it will be seen that other criteria are available. Nonetheless, this is an area where experience on the part of admissions committee members is of inestimable value for it permits some sort of equating scale to be developed.

1. There is much evidence to indicate that students in Great Britain and on the Continent, though they are usually only about 18 when they begin the study of medicine, have had superior general education compared to most high school graduates in the United States.

2. *The Appraisal of Applicants to Medical Schools*, edited by H. H. Gee and J. T. Cowles, *J. Med Educ.*, October 1957, Part 2.

2. *What does an erratic grade performance mean?* Not uncommonly applicants are found to have a spectrum of grades—some very good, some quite poor. Often a record which includes excellent grades in non-science courses and poor ones in science fields points to lack of interest on the part of the given student in medicine. On the other hand, the reverse situation may not have as serious an import, at least insofar as the student's ability to handle effectively the medical curriculum.

The student, whose grades are initially relatively unimpressive but progressively improve, is probably a good bet for satisfactory performance in medical school. Conversely, the student whose grade record shows progressive deterioration must obviously be viewed as a distinct risk for medical school unless some very convincing explanation is apparent.

3. *Other factors regarding grades.* The interpretation of the significance of grades should take into consideration the amount of effort involved. For example, one student may compile a relatively good grade record but only by virtue of an enormous expenditure of study time. In contrast, another student may do as well while carrying on one or more time-demanding extracurricular activities. As already mentioned, the latter may well have learned to use his time much more effectively (and may well be more natively endowed in terms of intellectual ability). Knowledge of the time spent by given students in outside jobs similarly may help in determining the real meaning of grades.

Admissions committees have observed the performance of the so-called "late bloomer" with satisfaction—e.g., the man who compiled a very poor academic record, subsequently went off to military service or some other pursuit, and returned to academic life as a mature and dedicated student. Such individuals may do extremely well in medical school.

Of interest is the experience of many medical schools with students who already have other advanced degrees—master's or Ph.D.'s. Although no blanket statement can be made, often such students, who have previously had commendable grade records, do poorly in medical school. Perhaps such showings are in keeping with the rather widespread experience that students in their late twenties, and especially those past thirty, in general do not do well in medicine.

Medical College Admissions Test

The MCAT, now required almost universally of medical school applicants in this country, is of real interest in respect to the question of selection of students for medicine. This test, administered by the Educational Testing Service of Princeton, New Jersey, is given twice yearly throughout the country, and is usually taken by students during the year prior to their applying to medical school. This fact is of some importance in that in those areas where students commonly enter medical school after only three years of college, the test is commonly taken during the spring of the sophomore year. As might be expected, the test scores for students at this relatively

early stage are apt to be lower than those registered by students who are finishing their junior year or those who are in the first half of the senior year.

The MCAT is an objective procedure, measuring the four areas enumerated earlier (verbal ability, quantitative ability, knowledge of modern society and science achievement). The test is scored so that the mean for each examination is set at 500. No passing grade is given, but the percentile level for the range of scores reported is as follows:

<i>Score</i>	<i>Percentile Rating</i>
800	100
750	99
700	98
650	93
600	84
550	69
500	50
450	31
400	16
350	7
300	2
250	1
200	0

Each year the MCAT results for each applicant are circulated to the medical schools, and an analysis of the average scores and range for the given colleges is prepared. The average scores for certain colleges differ significantly from those of certain others. A number of factors enter into the MCAT performance above and beyond the basic ability of the individual being tested. For example, students who are not familiar with objective tests may do less well than they might otherwise have done had they been exposed previously to this type of procedure. The MCAT is given with a limit of time, and there are those students who do less well when they feel the pressure of a time limit. Obviously students who are ill when they take the MCAT may not perform at their maximum. Language difficulty is a significant handicap, particularly on the first portion of the test, but it may reflect itself on all four sections. For this reason, the MCAT results for applicants whose knowledge of English is limited must be interpreted accordingly.

In selecting students for medical school, admissions committees usually assign major importance to MCAT scores, although they rank after grades as a predictive measure. Particular significance is assigned to the score measuring science achievement; some contact with basic courses in chemistry, biology and physics is necessary if a student is to do his best on this portion of the test. It is not, however, important of his having been exposed to advanced courses.

When all four MCAT scores are high, it can be inferred that the student has above average ability. When the scores are erratic, the situation is more

difficult to interpret and must be treated in the light of all the other data available.

In some schools, the MCAT, or part of it, is used for the purpose of equating grades from different colleges. Thus, if the MCAT science achievement scores for the students of a given college are relatively low, less importance would be assigned to course grades of A than in the case of another group of A students from a college where the comparable MCAT scores were decidedly higher. It must be emphasized that this use of the MCAT has not shown to be statistically valid and thus represents an arbitrary approach. Nonetheless, it may be effective in certain schools where considerable experience along these lines has been compiled.

When MCAT scores are high and course grades relatively less impressive, it is probable that the academic prognosis may well be better than when the reverse situation, i.e., high grades and low MCAT scores, exists.

The basic question regarding the predictive value of the MCAT scores for success in medical school was discussed at length during the 1956 Teaching Institute of the Association of American Medical Colleges. This question has been studied at several schools with rather marked disparity in the results. Thus, W. W. Morris found a positive correlation between MCAT scores and subsequent medical school performance of students admitted to the University of Iowa College of Medicine. Conversely, at the University of Virginia School of Medicine, Oscar A. Thorup observed no correlation whatsoever.

In any case, it was concluded at the 1956 Institute, and I must agree, that the value of the MCAT as a predictive measure, can only be assayed by each admissions committee, at each school, in the light of its own experience.

Letters of Recommendation

Commonly applicants are asked to obtain recommendations from college instructors with whom they have had courses. Although the student has leeway in selecting the instructors to act in this capacity, he is generally directed to include several from science departments and at least one from a non-science department. Some schools also solicit or accept opinions from persons whose acquaintance with the applicant is non-academic.

To discuss the latter first, it is usually true that such letters are extremely commendatory, often uncritical, and, indeed, not infrequently received from persons to whom the applicant is known only through a third party. In other words, although there are exceptions, it is my own opinion that the useful yield from such recommendations does not justify their being obtained. This point of view is shared by many others interested in admissions.

On the other hand, letters of recommendation (or recommendation forms designed by the admissions committee itself) may be very valuable. As with other criteria, blanket statements as to the value of recommendations cannot be made. It is obvious that if a school admits a number of students from college A year after year, and these students have been recommended by

Professor X, in a few years it becomes clear that Professor X is or is not a critical observer.

There are certain variables which must be appreciated by the admissions committee in evaluating recommendations. The number of students in a given college class will obviously have import in regard to the degree of contact between student and instructor. The nature of the contact is likewise important.

The premedical advisers in certain colleges have developed extremely keen judgment about the potentialities of students for medicine, and can be relied on to afford predictive statements of high validity.

In dealing over a period of years with the same premedical adviser, the admissions committee can obtain useful comparisons between current applicants and past ones. If the advisers are kept apprised of the performance of their students admitted to medical school, they are in an even better position subsequently in advising the committee.

Unfortunately those who recommend applicants to medical school are not always guided by the same principles of judgment as those who select students. On the other hand, the increased participation by premedical advisers in discussions of the admissions problem and the improved communication between advisers and admissions committees will undoubtedly enhance the value of recommendations supporting applicants for admission.

The Interview

It was noted earlier that applicants for medical school are often required to be interviewed by members or representatives of admissions committees. Where the interview is not an absolute requirement, it is usually requested in rather positive terms. And there can be no doubt that most admissions committees attach major significance to the interview. An interview, of course, can be many things to many people. To the anxious applicant, it is much too commonly a traumatic prospect. To some unenlightened interviewers, it is a form of inquisition. There are those who use it as a factual examination of the candidate's knowledge of the sciences.

It cannot be denied that a person-to-person meeting provides an opportunity which cannot be gotten from any amount of written evaluations, transcripts, test scores, etc. To the skillful interviewer, who knows how to put the applicant at ease, it affords the means of determining something about the applicant's warmth, his perspective, the breadth of his interests and of his motivation. The latter quality, as important as any and more important than most is perhaps the most difficult of all the desired attributes to evaluate. We have no satisfactory objective measure of motivation, but at times the interview, when properly structured, may provide the interviewer with some idea of the applicant's desire for medicine.

The interview may be used both by the applicant and by the admissions committees for the discussion of questions and problems, general or specific, of concern to either. Frequently, in reviewing applications, the admissions committee may come across questions which require clarification, best

achieved in a personal discussion with the applicant rather than by correspondence.

A useful by-product of the interview, especially when it is carried on at the school, is that the applicant at the same time can see the school, talk with students enrolled, and satisfy his curiosity about many of the collateral aspects of medical school which interest all applicants.

Having recorded all the foregoing comments regarding the interview, I feel obliged to report in brief fashion on the very stimulating and provocative discussion of the interview which took place at the 1956 Teaching Institute. There, Dr. E. Lowell Kelly, professor of psychology at the University of Michigan, presented a critique of the interview which exploded upon the assembled gathering of admissions officers with the subtlety of a large bomb. Dr. Kelly, one of the country's leading authorities in the field of assessment, carried on studies on the technique of selection of various kinds of military personnel—pilots, aircraft gunners, etc.,—during World War II, and has continued his work in the field of assessment.

Dr. Kelly began by acknowledging the fact that he would be unwilling to select either a wife or secretary without an interview. He then proceeded with a comprehensive review of the *controlled* studies of the interview as a predictive measure, and his analysis was devastating to the preconceived notions of most of us in showing that there was *no* clear-cut evidence that the interview had any value at all. The studies discussed by Kelly dealt, among others, with the selection of salesmen, clinical psychologists and psychiatrists. The last two, one carried on by Kelly's group at Michigan, and the other by Holt and Lubersky at the Menninger Clinic, were extremely carefully organized. In none was the interview found to have validity as a predictive measure. Similarly, in the World War II observations, no positive correlation was found between the interview judgment and the ultimate success of the particular person involved.

In the discussion which followed Dr. Kelly's presentation, there was basic agreement with his conclusions, namely, that no acceptable evidence supported the value of the interview as a predictive measure. Although by hearsay it is said that some studies disagree with this statement, none has been published. Kelly and others interested in the field agree that further studies are essential, particularly some dealing with the interview as an instrument for the selection of medical school applicants. One such study is now under way at the University of Michigan. Although it would be possible to design studies which would contribute to our evaluation of the interview and other measures in the selection of students, such investigations would require a larger measure of courage than is possessed by most admissions committees or deans!

It is probably fair to agree with Dr. Kelly's concluding remark at the 1956 Institute. "I am going . . . to predict with a very high level of confidence that the selection interview will continue to be a widely used and highly respected technique. No amount of negative evidence regarding its

validity seems likely to change the situation. I predict that the popularity of the interview will decrease only when and to the degree that more valid techniques and devices are developed to do the practical job of selection in our complex asylum."

There can be no doubt, however, that the interview, in the hands of participants in the 1956 Institute, will not be used with the carefree assurance with which it was once employed. Whether Dr. Kelly's implied confidence that it will eventually be shown and accepted that the interview, as a selective measure for medical school applicants, will be discredited, remains to be seen. In any case, its value as a public relations measure probably assures its position in any case!

Other Objective and Projective Tests

There is, at present, inadequate evidence regarding the value of these procedures in the selection process. Currently, under the direction of Dr. Helen Gee, Director of Research of the Association of American Medical Colleges, a most important study of certain objective tests (Strong Interest Blank, Allport-Vernon-Lindsey Study of Values and the Edwards Personal Preference Schedule) is in progress in 24 medical schools, representing a cross-section of the schools in this country. From Dr. Gee's investigation, and from others like it, we can expect to improve ultimately our techniques of selection.

The value of certain of the projective tests, in the hands of skilled professional consultants, has been made apparent. Such tests may be especially useful in evaluating applicants from the psychiatric point of view and as such are used in many areas.

Conclusions

Interest in the evaluation of applicants for admission to medical schools of the United States has increased markedly over the past 25 years. As a result, the admissions committee has been chosen with greater care and often has been directed by a chairman who devotes a significant part of his time to this responsibility. Much progress remains to be made in the effectiveness of the selection process; studies now under way should contribute significantly.

In my years as chairman of an admissions committee, I learned one important thing—humility. If all who serve on admissions committees acquire a therapeutic level of this quality, they not only will, within the limits of their ability, perform adequately, but more importantly, they will continually examine critically the admissions process with a view toward contributing to its improvement. As an ultimate result the medical profession and thus the population as a whole will benefit.

Objectives and Organization of a Medical School

ROBERT F. SCHILLING, M.D.*

Definitions

A *medical school* is much more than the student-faculty partnership leading to the award of the medical degree for the successful student. It is more than the school in the university which educates students to become physicians and responsible citizen leaders. As a part of a university it carries the clearly understood responsibility of organized but unfettered attempts to increase knowledge of health and disease. Because a medical school is by necessity the dominant feature of a university medical center, it also furnishes a large amount of medical service to the community through the hospital and clinics in the medical center.

Ideally a medical school is the well from which flows, or is pumped, teaching, research and some medical service. As regards sources of financial support and organizational background, there are two general types of medical schools in the United States. The privately endowed medical schools were the first type to appear in this country. The state supported medical schools in the country are not more than 100 years old. Private schools were founded on the strength of endowment funds and are now supported by yields from endowment and funds from grants in aid of research. It should be noted that such schools receive large amounts of tax money from the federal government in the form of grants in aid of research and less in the form of grants for the aid of teaching. In general they do not receive tax support from the state in which they are located.

A state school is one which derives its major financial support from tax funds appropriated by the state legislature—usually such an appropriation is made every 2 years. Some medical schools make direct requests to the state legislature for their budget, others deal with the legislature only indirectly as a part of the total university budget request.

A University medical center is composed of a medical school and its auxiliary schools and physical plant:

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MEDICAL SCHOOL

Pre-clinical Science Buildings
 Clinical Science Building
 General & Special Hospitals
 & Clinics
 Library
 Student Dormitories for
 Medical Students
 Student Health Clinic for
 all University Students
 Research Institutes

SCHOOLS OF:

Dentistry
 Public Health
 Postgraduate Medicine
 Nursing
 Medical Technology
 Medical Social Work
 Physiotherapy
 Occupational Therapy

Of the three categories of medical education offered by a medical school, undergraduate medical education would appear to be the most important because it represents the greatest chances to help or to hinder students of medicine in their formative period. My definition of undergraduate medical education is the five years spent in medical school and the internship.

Graduate medical education is interpreted as meaning the educational process involved in learning to be a specialist as practitioner, teacher, or investigator.

Postgraduate medical education is intended to cover lecture and demonstration courses and clinics for people actively engaged in the practice of medicine. This type of medical education is attempted with increasing frequency in this country and does not often offer the opportunities for teaching as defined by Rabellais: "To teach is to cause to learn."

Objectives of a Medical School

Undergraduate medical education: (1) To assist the student in acquiring at least a minimum of the large number of useful facts about medical science. The student can use reason or logic in his approach to a problem if (a) he knows a sufficient number of relative facts, or (b) he has time to acquire these facts by study after being confronted with the problem. The classical approach in medical education for the past 40 years has been (a).

(2) Develop in the student the ability to meet a problem with a logical and critical approach.

(3) Successfully germinate in the student a rust-resistant strain of the perennial flower known as self-education. If properly implanted and nurtured during the undergraduate medical curriculum, this flower will continue to bloom for many years in the face of adverse postgraduate conditions.

(4) Provide increased freedom for student choice of elective educational opportunities because not all students have similar interests or talents. Increased freedom of choice should also be allowed in the college work of people who intend to study medicine.

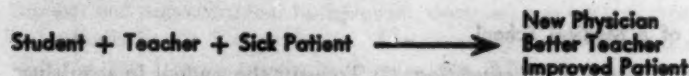
(5) Inculcate in the student a strong sense of duty toward his patient, his society, and himself as an individual with an unusual education experience.

(6) To train physicians to utilize to the fullest the scientific method in medicine without loss of understanding and friendliness. The latter I believe can best be done by precept. The former can be taught with eminent success as is witnessed by the success of medical research in the past quarter century.

An excellent statement of the objectives of undergraduate medical education appeared in the *Journal of Medical Education* Vol. 28, page 57, 1953.

Research: Most medical schools are part of a university and one of the traditional functions of a university is the furtherance of knowledge. Research in biology and medicine is being conducted at a tempo and quantity in excess of any previous era in the history of mankind. There are many who feel that the rapid tempo and organizational structure are hindering the contemplative approach which is thought to be so essential to clear thinking and incisive experimentation. Some observers believe that the average quality of research effort is lower than a few decades ago. Proof of this thesis is difficult. Few, however, would doubt that the over-all yield of knowledge has increased greatly due to the gigantic increase in man power and money being expended in medical research. As long as the system of mass research effort does not discourage nor hinder the truly gifted investigator and society can afford the research effort, it is difficult to see anything but benefit in a massive effort in biological and medical research.

Service: (1) Medical service is not one of the primary aims of a university medical school. The process of learning to be a physician can be carried to a utilizeable yield only when patients are present in the reaction mixture. Therefore an integral, necessary and welcome feature of a medical school is a medical care unit.

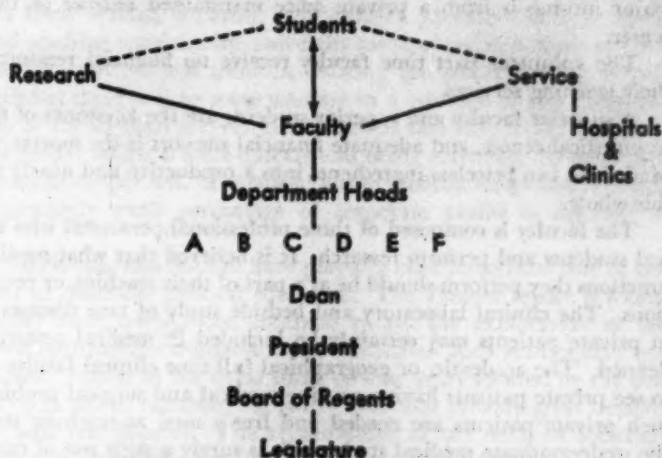


Two general types of medical care service must be provided by a medical school:

a. General, routine, common. Mainly for teaching purposes. House staff will do much of this care.

b. Highly specialized, unique, exotic. In this category would be patients requiring unusual diagnostic or therapeutic procedures. It is evident that not every community can or should support a cardiac catheterization and surgery team. The same is true for many types of radio-isotope study or for some of the most complicated roentgenology techniques. Also in this category would be selected patients from the "incurable disease" group. I refer to such illnesses as cancer, rheumatoid arthritis, lupus erythematosus, arteriosclerosis, glomerulonephritis, to mention only a few in the area of internal medicine. Patients with genetic abnormalities might be studied in detail by those investigating this area. You will note that much of this medical care is being advocated for illness for which we have no specific cure. The separation of this type of service from research is not only impossible, it is undesirable.

Organization of a Medical School:



As a generalization the preclinical faculty of a medical school derives its income exclusively from university salaries. Perhaps the low level of these salaries compared to the incomes of practicing physicians has been one factor promoting the present shortage of adequately trained anatomists, physiologists, and pharmacologists. That this is not the only causative factor operative is evidenced by the abundance of biochemists.

The clinical faculty is usually composed of several groups defined as:

- academic full time
- geographic full time
- part time
- volunteer part time

The academic full time faculty member derives his entire income from his university salary. Fees for his services to private patients are collected by the medical school. His income is not dependent on the number of patients he served in the past year. Johns Hopkins, the University of Chicago and Cornell Medical College are examples of schools where this type of faculty has been very effective. A possible danger in this system is that a medical school might exploit the faculty member as a source of income.

The geographic full-time faculty member is one who sees private patients in the university medical center, and collects from the patient a fee for his services. His income is obviously dependent on the number and size of collections. Harvard has used this system with obvious success as a leading medical school. A possible danger in this system is that the faculty member may exploit his position to earn a large income while not contributing sufficiently to teaching and research.

The part time faculty comes to the medical center several half days each week and receives a small stipend for his teaching services. However, his major income is from a private office maintained *outside* of the medical center.

The volunteer part time faculty receive no financial remuneration for their teaching services.

A superior faculty and superior students are the keystones of the university medical center, and adequate financial support is the mortar which will bind these two priceless ingredients into a productive and nearly indestructible whole.

The faculty is composed of those professional personnel who teach medical students and perform research. It is believed that what medical service functions they perform should be as a part of their teaching or research functions. The clinical laboratory and bedside study of rare diseases occurring in private patients may certainly be included in medical research broadly defined. The academic, or geographical full-time clinical faculty ought not to see private patients having routine medical and surgical problems unless such private patients are needed and freely used as teaching material for the undergraduate medical student. It is surely a poor use of talent for an able professor of medicine or surgery to use a large portion of his time and energy in caring for private patients who might very adequately be handled by any one of several other physicians in the community. A university which encourages such an arrangement by paying its clinical faculty salaries which are unrealistic, is surely pursuing a short sighted policy. What I have just said is not to be construed as advocacy of abolition of the private consultation privilege, but quite the contrary. I feel it is a very useful feature if properly practiced. There is no reason why a patient who is able to pay for the special skills of a professor of medicine should not do so *provided* he has an illness which requires such skill for diagnosis or therapy.

Sources of Financial Support:

Separation between private (i.e., endowed), and state supported schools is not as wide as formerly. Some of the private schools look to federal funds for research for a large share of their total budget. It is common for associate professors and even professors to be partly paid from research grants. The sudden withdrawal of federal support of research would cause a tremendous upheaval in many medical schools. Not only would research efforts be sharply curtailed but many teacher-investigators would be holding jobs with salaries much less than they had last year. This is not likely to happen because the federal legislature has been educated to the value of research. Support is likely to increase; long range planning is needed. Tax-supported schools derive the major share of their salary budget from funds appropriated by the state legislature. There are no federal schools of medicine.

Another differential which has diminished as a distinguishing feature between private and state schools is the matter of endowment funds. Pro-

gressive state schools are aware that they cannot expect unlimited financial support from their state legislatures, and they therefore are seeking endowment funds from alumni, industry, and wealthy patients. Because of its research and teaching activities the university medical center is likely to have available unique services and technics. Among the patients being helped by these technics there will be some who are in a position to give funds for the support of the medical school. It is believed that this is one source of endowment money which is most quickly and easily available. Another and potentially much deeper well of financial aid to medical education is industry. A surprisingly small percentage of corporate profits is donated to education.

The philanthropic foundations have played a most influential role in the development of American medical education. The Flexner report is a classical example. Such foundations continue to aid the exploration of the socio-economic-psychologic borderlands of medicine. Such studies may not yield "practical" results in the usual three or four years allotted by the customary grants in aid of research, but surely they will provide great benefits within the next few decades. The relationships of the fields of sociology and economics to medicine are very numerous. Experimental control is most difficult in these areas and for this reason initial progress has been slow compared to the progress in biochemistry and bacteriology. It will be apparent to anyone who is familiar with American medical education that our graduates cannot be considered well equipped to explore the frontiers between sociology and medicine or psychology and medicine.

With a rising standard of living in a country or a community there will be an increased demand for medical services and the type of medical services desired will shift from acute severe, illness and trauma toward care for chronic degenerative and psychiatric or psychosomatic disorders.

Obviously, a medical school should plan its teaching and research and service in the areas most in need of help. In the United States one might question the tremendous emphasis on cancer research when mental illness is of far greater social, economic, and individual consequence. Part of this relative lack of effort to help the emotionally ill person is due to the apparent nature of the problems to be solved. At the moment the problem of understanding and curing most psychiatric disease might be likened to the problem of scaling a smooth vertical wall of great height. There seems to be no way of even trying. The conquest of degenerative diseases or cancer might be likened to the problem of ascending Mount Everest in the 1930's and 1940's. Many wanted to accomplish it or aid in its accomplishment. Many more believed it was entirely feasible if enough time, thought, talent, and money were utilized. A few believed it was impossible. What is needed to scale the vertical precipice leading to the control of mental disorders are more workers and leaders who are willing to spend a life-time carving a few factual steps on which the next climber may stand while discovering the facts which will enable ever further ascent to be made. We cannot plan on the good fortune of finding a genius able to design a simple "idea rocket" or helicopter

which will carry us to the top of this great wall in a brief and effortless trip.

Some students of medicine must come to believe that theirs is the privilege and duty to tackle the really difficult problems which face mankind. Youthful dreams must be given charts and compasses to allow them to sail the known to reach and chart the unknown, the vastness and attractions should be pointed out to the beginner. They should not be given a heavy anchor of discouragement by trying to force them to learn too much of what is already known. No one person can explore any large portion of the unknown. One must therefore learn what is known about the borderland of the area he wishes to explore. This means a choice of concentrating, i.e., specialization.

Problem for the Medical Schools

How to fulfill society's need for (1) physicians who understand more about the specialized scientific aspects of medicine. Men who increasingly are using scientific facts as the basis for their decisions in the treatment of the diseased person. Men capable of doing incisive research on diseased persons without harming them. (2) physicians who understand the relationship of medicine to society, of the physician to the patient, and the patient to society; the forces of economics as they play upon health and disease; the problems of sociology and psychology and their relationship to medicine.

A doctor cannot be all things. He should beware of trying to be too many things lest he lose his special knowledge in medicine. I should like to quote from three recent essays to sharpen the outlines of this problem:

J. Robert Oppenheimer¹

"There is much more that one might know than any of us are ever going to know. There is much more to know than any of us are ever going to catch up with; and this is not just the trivial fact that things are difficult to learn. It is that any form of knowledge really precludes other forms; that any serious study of one thing cuts out some other part of your life. Narrowness is not an accident of one place, but is a condition of knowledge.

But I think it has not been quite as clear how, in the very conditions of knowledge, choice is built in and exclusion is a part of depth."

Sir Lionel Whitby²

"But there is evidence that there is now some poverty of mind in the finished medical and science graduates because of lack of general education in the humanities, literature, language, history, philosophy, and the arts. There is little doubt that the medical student who is to be a practising doctor should understand the world in which his patients live, and should be able to approach them as human beings with a depth of understanding that can come only

from an appreciation of civilized values. We are indeed aware of the obvious dangers of too early specialization in science among those who are going to graduate in science and medicine."

Raymond B. Allen^a

"The character of a doctor's education is therefore a most important factor in its long range constructive influence on the community. Most physicians who are attracted to community life as family doctors and even as specialists are the kind of people who do not allow the technical and scientific character of their medical education to obscure their natural human approach to their patients and fellow citizens and their problems. As a community is educated to demand more preventive medicine and as it loses its complacency in the face of such evidences of social deficiency as poverty, unemployment, industrial strife, malnutrition, high rates of juvenile delinquency, and illiteracy, the doctor will come to occupy an important place of social responsibility indeed. It should be the aim of medical education to prepare him to fulfill this broader role as a responsible leader in the community, one who thoroughly understands the social, industrial, and economic patterns of which he is a part. . . . Does medical education share in the responsibility for the failure of the medical profession to exhibit social insight and aggressive leadership in molding public opinion toward a comprehensive handling of the problem of adequate medical care for the people? He says the answer is undoubtedly, 'yes.' He feels that in the past adequate attention has not been given to the social implications of medical practice and social responsibility of the physician. He feels it is the responsibility of the school and university systems to so educate physicians that they will be as proficient in meeting and solving the social and economic problems of medical service as they are in handling the professional and technical problems of the practice of medicine.

"Are medical students stimulated and inspired by modern concepts of social medicine to conceive of themselves as responsible citizens of the future who must exercise responsible leadership in the community in cooperation with other public spirited citizens?"

Carleton B. Chapman^a

"The medical profession is thus envisaged as a sort of super-market of cures to which an individual in any sort of distress, real or imaginary, can apply for relief. For the individual patient, the attempt seems to be heading toward the establishment of an Orwellian 'Big Brother' role of medicine, and its very *raison d'être*, is to provide the patient with scientific medical care at the highest possible level. Beyond this, anything the physician can do for his

patient is all to the good, but it does not stand to reason that he can, in addition to being a good doctor in the scientific sense, be equally competent in the role of the religious leader, the economic planner and the social worker. The greatest danger of all lies in the fact that, should he attempt to be everything to all men, he may neglect his responsibility as a scientist. The sole feature, after all, that distinguishes the physician from healers of all sorts is the acquired ability to cope, scientifically and methodically with human disease. Medicine is and must continue to be a learned profession, not a disjointed collection of technics with no theoretic basis.

"Neither is it an appropriate stage at which to begin the vital process of making a human being out of the student. If he is not honest, sympathetic and well-integrated when he enters medical school, he is unlikely to be all these things when he leaves. The inescapable responsibility of the medical school is to make medical scientists out of the best student material it can get. And in the rush to make students into paragons of universal understanding and accomplishment, the main responsibility is becoming obscured."

There is good reason to believe that we need physicians who can fill either of the above roles. Is it reasonable however to expect most or any medical graduates to be ideal in both? I say no. Therefore I advocate greater freedom of choice for the pre-medical and medical student in the matter of course work and educational opportunities. I do not advocate one easy road and one difficult road to the medical degree. It would appear wise to allow students some opportunity to follow their natural bent while in the university. Surely society needs well trained physicians to fill the two roles delineated above. Medical schools have been derelict in the past in making too rigid the concept of the training of physicians. The challenges are great and men of many talents can be successfully utilized.

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A Comprehensive Evaluation of the Development of the Medical Curriculum

JOHN Z. BOWERS, M.D.*

THERE IS A FAMILIAR adage in medical education that when faculties have nothing better to do they change the curriculum. There is unquestionably an ubiquitous interest in curriculum development, and it is important that faculties do not revise the curriculum simply to keep in tune with the popular theme. The improvement of a medical curriculum is an undertaking which requires meticulous evaluation and imaginative planning.

Each medical school has different opportunities and different problems. Its curriculum should be developed in line with the ability of the faculty, the needs of the students, and the resources of the school. Thus, a curriculum study should never be initiated with the idea of adopting a curriculum solely on the basis of its success at another school.

During the past 12 months we have been through a period of curriculum revision at the University of Wisconsin Medical School. The faculty, of its own initiative, proposed a complete review of the educational program, and we set ourselves to the task. My remarks, then, will be based in part upon a procedure that was successful at Wisconsin, but for which we borrowed extensively from experiences at other medical schools—notably Western Reserve.

An educational program in any department of a medical school directly or indirectly affects the programs of the other departments. Thus, it is important that a curriculum study group have broad representation from the various departments of the school. In any comprehensive evaluation of the curriculum, the study group should include individuals representing each major department. The members may be appointed by the dean or nominated by the departments. Naturally, it is important that they have a sincere interest in medical education and that they be able to consider the exigencies of the total curriculum rather than the interests of their own department.

The chairman of the committee may be appointed by the dean, elected by the faculty or by the members of the committee.

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The activities of the committee must be carefully documented by a secretary, and the minutes of each meeting should be circulated promptly for review.

If a Curriculum Committee is to function effectively, it is essential that it be generally understood that all potential revisions will be submitted for review by the entire faculty. A statement of operation should be distributed to the staff in sufficient time for discussion at departmental meetings and for individual consideration. This statement might include the following points:

A. The Committee desires to be given authority to evaluate the teaching in all departments by means of:

a. Examination of course schedules for content and relation to the program of the school as a whole;

b. Requests for self-evaluation by each department of its work in the light of the standards suggested by the "Objectives of Undergraduate Medical Education;"

c. Collection of opinions of students (particularly "faculty-students" and graduates) regarding course effectiveness;

d. Auditing of courses by committee and sub-committee members;

e. Visits to other medical schools;

f. Visits and discussions to this school by medical educators;

g. Such other methods of examination as appear most likely to produce objective evaluation;

h. Comparison of the efforts of this school with those of other teaching centers.

i. Evaluation of the Preceptor Program.

When sufficient data are available regarding the work of any department, the Committee proposes to meet with the faculty of the department concerned and to discuss with it recommendations concerning course content, sequence of presentation, additions to or omissions from the curriculum, in the light of the "Objectives of Undergraduate Medical Education" mentioned and the work of other departments. Following such discussions, it is proposed to submit a report of all conclusions and recommendations concerning the departments studied and the curriculum as a whole to the Executive Committee and the faculty.

B. It is proposed that the Curriculum Committee be given responsibility to consider alterations in time allotments of each department in accordance with current needs in medical education, with an eye to the over-all program of the school as a whole. A necessary corollary to this would be that other alterations in time by informal arrangement between departments would be strictly forbidden.

Too frequently curriculum development programs are undertaken without first understanding the existing program. One of the most important con-

tributions to a curriculum project is the self-analysis that should be requested of each department. At Wisconsin the first action of our Curriculum Committee was to ask each department the following questions:

1. What are the objectives of your present program?
2. How do you achieve these objectives?
3. Are there deficiencies in your present program?
4. Are there any areas of needless duplication in the educational program of the medical school?
5. What are your recommendations to the Curriculum Committee?

It is important to emphasize that this statement should be a complete *departmental appraisal*—not simply the ideas of the chairman or head of the department.

After the departmental statements have been submitted and studied, the various chairmen should be invited to meet with the Curriculum Committee individually to discuss various aspects of the report. Sufficient time for a relaxed yet stimulating discussion should be scheduled.

At this time in the study, the reports of the various departments should be synthesized into a statement of the educational objectives of the medical faculty. The best statement that is available was developed by the Association of American Medical Colleges and should be carefully studied by any faculty developing a curriculum.

In addition to the departmental chairman, other faculty members should be afforded an opportunity to present any opinions that they may have to the Curriculum Committee.

As the study of existing programs proceed, problems that deserve particular attention should be determined. The clinical clerkship, teaching from the ambulatory patient, free time, and integration of the basic sciences are topics that may be of paramount concern. These specific problems may be reviewed by sub-committees, drawing on additional faculty members, who have specific interests or skills in the area of concern. The organization of the curriculum development program should afford an opportunity to bring additional faculty members into the effort.

Medical students always enjoy an opportunity to express their views about a teaching program either by questionnaires or by conversations with the faculty. Both techniques may be employed to advantage. It is important to avoid expressions about personalities on the faculty but instead to concentrate on more fundamental issues.

Alumni attitudes, particularly alumni who are faculty members (and who are objective) may also be valuable.

Above all else, it is important that a program to evaluate the curriculum be undertaken with a rate of progress that will assure the faculty that the study is an objective, careful appraisal of existing programs and a considered effort to recommend improvements. Too frequently, Curriculum Committees take the attitude that their first job is to make recommendations as rapidly as possible. The faculty will gain confidence in the Committee if

the study proceeds at a pace consistent with sound observations and proposals.

When a new curriculum has been determined, it should be circulated to the faculty for study before a meeting is called to consider adoption of the program.

Subsequently, it is important that members of the Curriculum Committee maintain close contact with the progress of the new curriculum. When a new curriculum has been adopted and implemented, it should be allowed to run for at least three years before any major changes are considered. It should be remembered that it takes time for the faculty and the student body to adjust to new programs.

Current Trends in Medical Education:

A Research Approach

THOMAS HALE HAM, M.D.*

THE CURRENT TRENDS in medical education may be interpreted more readily by examining the heritage that has lead to the methods employed in the United States at this time, the mid-twentieth century.¹⁻¹⁰ Training of the student by the clinical preceptor for a period of three years of apprenticeship was the major form of medical education for the first two centuries and until 1850 when its decline began with the advance of medical schools.^{1,2,5,7,12} The university schools of Germany and England, and the clinical hospital schools of France and England have been the antecedents of the current organization, the university medical center.^{5,7,12} More than 400 proprietary schools were organized in the United States over a period of 100 years and have disappeared entirely or have been reorganized since the period of 1910 and the report by Flexner.^{4,6,7}

At any period in the past three centuries in the United States, medical education appears to have been the resultant of three major influences,¹ namely, the medical practice, the educational methods and the scientific knowledge. The current form for education of the physician has been described by Turner¹¹ for the United States. Many changes in medical education are in progress.¹²⁻²⁰

In the university medical center, research in the biologic sciences and in clinical problems is now recognized as a major endeavor in all preclinical and clinical departments. In some centers, the research approach has been initiated in two other fields of responsibility, namely, the program of medical education and the methods employed in health services and patient care. This introduction of the scientific method to all three areas of responsibility of the medical school and its allied hospitals has influenced markedly the approach^{16,17,20,21} of the faculties and physicians in many instances as they have planned their programs.

The experimental approach in medical education has usually begun with a reexamination of the objectives^{16,17,21,22} of the profession of medicine, of the educational program and of the faculty.^{16,17} There is a willingness to consider the philosophy of the physician and that of his education²³⁻²⁵

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as well as his technical training. From these considerations it has been possible to select students and to evolve a plan that includes a consideration of the student's educational environment,^{14, 22, 23, 26} and the general methods of education.⁴²⁻⁴⁵ To these have been added the particular medical aspects of the program and the facilities needed. The curriculum then becomes the derivative of the objectives and of the planning, the practical translation of careful thinking. The curriculum will require continuing change as advances occur in the many fields from which it derives its origin. Any program of medical education is difficult indeed to evaluate but the several kinds of results are subject to the methods of the investigator, namely, observation, description and measurement in terms of the planned objectives.⁴²⁻⁵⁰ Obviously, many decades are needed before valid conclusions can be drawn from any program of education and the scientific approach is required for the evaluation.

The research approach^{14, 17} in medical education is evident in many schools of medicine as reviewed by Berry.² Also, the Association of American Medical Colleges is conducting research, is publishing results of studies in the *Journal of Medical Education*, is inviting reports on experiments at its annual meetings and has held a series of teaching institutes^{2, 15, 16, 17, 18} and plans more for the future.³ The Council on Medical Education and Hospitals of the American Medical Association continues to observe and encourage careful experimentation in medical education as outlined by Turner.¹¹

A conscious effort is being made in many schools to treat the student^{6, 10, 17, 21} as a maturing individual and as a student in a graduate professional school who is given increasing responsibility for his own education, for a knowledge of medicine and for care of patients. There has been emphasis on scheduled free time, opportunities for research^{20, 42} and for elective studies. The educational environment is considered as related to examination systems,^{10, 19, 21} evaluation of student performance and counseling.

The dilemma continues of the increasing amount of knowledge that is available in the many special fields where advances are being made in research, in the preclinical and clinical departments.²⁰ The clinical specialist brings a high degree of excellence in patient care and a large fund of knowledge as teacher. The problems presented by the wealth of information available in the many departments and divisions require continuing study by the educator as he plans for the students' program.

There has been reexamination of the educational isolation that may occur from teaching by individual departments and from separating the biologic and clinical fields into preclinical and clinical periods of instruction. This has led to several forms of interdepartmental teaching and the extension of biologic and clinical fields into all four years. Certain schools have experimented with unit laboratories, or are planning them, in which multiple disciplines may be studied by the student in one place during the year.^{20, 22, 24, 27, 28} The objectives of this laboratory may include: treating

the student more as a graduate student; giving him a home base for laboratory work and study; correlating material so that the student may integrate it more readily; bringing economies by high rates of occupancy of laboratory space, by centralized purchase and supply and by broad availability of expensive equipment to students and faculty; making a skilled laboratory director available to assist with supplies, planning and execution of experiments. Research may be conducted in some student laboratories.²⁰ A unit laboratory used for 16 students in the first year of the School of Medicine at Western Reserve University^{26, 27, 28} is shown in Fig. 1. Unit laboratories are being planned for Stanford University and the University of Southern California in Los Angeles.

The patient has been the object of clinical teaching for centuries.^{2, 8, 31, 32} The case method has been a classic and a most successful form of education for the student who participates in the case. The case method is under continuing study and revision and currently is being explored in several medical schools in the first and second years to provide the student with the opportunity to study normal and abnormal patients.^{33, 34, 35} Long term comprehensive care is being extended in many schools for the study of ill patients and families.³⁴⁻³⁶ Excellence of care of the ambulatory patient by the student has been pioneered by such schools as Columbia University.



FIGURE 1. Unit laboratory for teaching multiple disciplines in the first year in the school of medicine at Western Reserve University.²⁷ Each laboratory bench is shared by two students, and there is a sink for four students. Each student has his own separate desk (on right) for microscopy and study. There are sixteen students in each laboratory.

Careful research observations are being made especially at Cornell^{40,42} and Colorado⁴³ concerning the care of the patient, the learning process and the student's response. Intramural clinical preceptorships^{44,45,46} are being introduced in some schools and represent an extension of the length of contact between the instructor as tutor^{47,48} with a small group of students. Extramural clinical preceptorships are being reevaluated.⁴⁹⁻⁵¹

Pedagogy is being explored at the University of Buffalo.⁴⁴ Investigation of student performance, and attitude is being conducted in several schools.^{42-44, 52, 53}

A symposium⁵⁴ on the teaching of biochemistry in 1956 gives several experimental approaches which are outlined here in part. As described by White and Lawson⁵⁵ of Albert Einstein College of Medicine, biochemistry is being combined with physiology and taught in the first year in a series of unit teaching laboratories designed for eight students. The subjects, hours and laboratory experiments are shown in Tables 1, 2, 3, as quoted from their description.⁵⁶ As stated by the authors, "It should be noted that neurophysiology and endocrinology, traditional segments of the instruction in physiology and for biochemistry, are missing from the subject list. In the

TABLE 1

Sequence of subjects in combined biochemistry-physiology course at Albert Einstein College of Medicine.⁵⁶

- I. Physical-chemical principles
- II. Cellular composition
- III. Enzymes
- IV. Biological oxidations
- V. Respiration
- VI. Energy metabolism
- VII. Carbohydrate metabolism
- VIII. Muscle
- IX. Circulation
- X. Protein metabolism
- XI. Lipid metabolism
- XII. Nutrition
- XIII. Large intestine; intestinal movements; feces
- XIV. Kidney; water and electrolyte metabolism
- XV. Special tissues and special body fluids
- XVI. Special senses

TABLE 2.

Type of Exercise	Hr.	% of Total Hr.
Lectures	36	9.5
Laboratory	252	65.0
Conferences	62	16.0
Clinical application of basic sciences	36	9.5
Totals	386	100.0

Distribution of hours in biochemistry-physiology course shown in Table 1.

TABLE 3.

Biochemistry-physiology: Laboratory experiments for course shown in Tables 1 and 2.

Experiment	Experiment
1. Osmotic behavior: red cell	16. Harden-Young effect
2. Metabolism of red cell in relation to osmotic changes	17. Muscle
3. Body fluid compartments	18. Gastrointestinal movements
4. Sicklemic hemoglobin	19. Biogenesis from acetate <i>in vivo</i>
5. Electrophoresis	20. Circulation
6. Enzymes	21. Heart-lung preparation
7. Biological oxidations	22. Biosynthesis of proteins <i>in vivo</i>
8. Lung pump	23. Biosynthesis of heme <i>in vitro</i>
9. Alveolar ventilation and dead space ventilation	24. Life span of the erythrocyte
10. Oxygen dissociation of hemoglobin <i>in vivo</i>	25. Nutrition:
11. Rebreathing	a. Nutritional anemia (rat)
12. Breath holding	b. Thiamine deficiency (pigeon)
13. Oxidative phosphorylation	c. Ascorbic acid deficiency (guinea pig)
14. <i>p</i> -Aminohippurate transport <i>in vivo</i> and <i>in vitro</i>	d. Pyridoxine deficiency (rat)
15. Carbohydrate absorption and glycogenesis	e. Choline deficiency (rat)
	26. Kidney: water and electrolyte metabolism

present curriculum of the Albert Einstein College of Medicine, neurophysiology and neuroanatomy have been organized as two separate but parallel disciplines presented by the departments of physiology and anatomy, and endocrinology as a single course organized by the departments of anatomy, biochemistry and physiology."

In 1952 a program was initiated in the Division of Medical Sciences of the Harvard Medical School in which biochemistry was taught as a part of a unified approach to graduate training for candidates for the Ph.D. degree. This has been described by Berry,² Karnofsky²³ and by Ball.²⁴ The course²³ lasts for one academic year, is taught in a special laboratory constructed to accommodate 20 students and takes up subjects in the sequence shown in Fig. 2. Also shown in this figure is the correlation of studies of the kidney that had previously been taught in the school of medicine in six different periods during two years. A few medical students have participated in this one-year course. Beginning in the fall of 1957, the curriculum of the pre-clinical years for the medical students of the Harvard Medical School will be rearranged as shown in Figs. 3 and 4 from Karnofsky.²⁴ This is a combination of departmental teaching and interdepartmental or correlated teaching. The student will be introduced to growth and development of man during two years. Free time will be scheduled.

In 1952, at Western Reserve University, an experimental program of medical education was initiated involving all four years of the curricu-

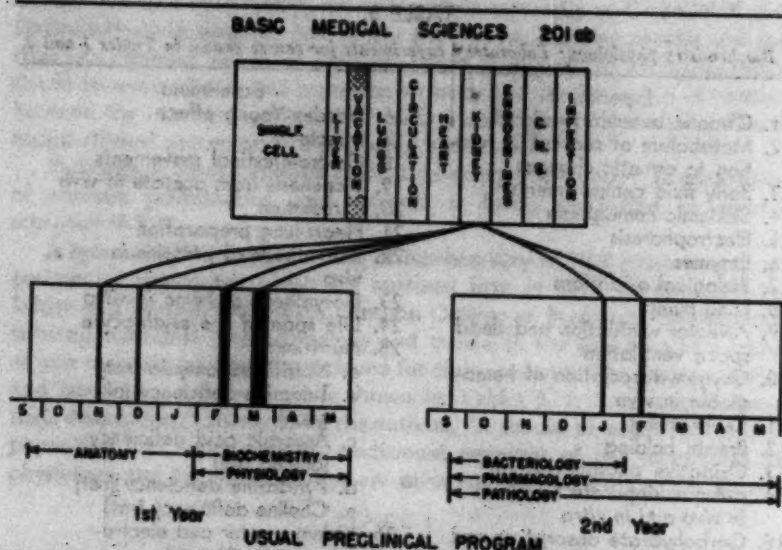


FIGURE 2. A diagram prepared by E. G. Ball and published by Karnovsky to show the unified approach to graduate training for Ph.D. candidates at Harvard Medical School. A comparison is made of the teaching of the kidney in the preclinical curriculum and in the course in medical sciences. This course for 20 students is taught in a special unit laboratory.²⁰

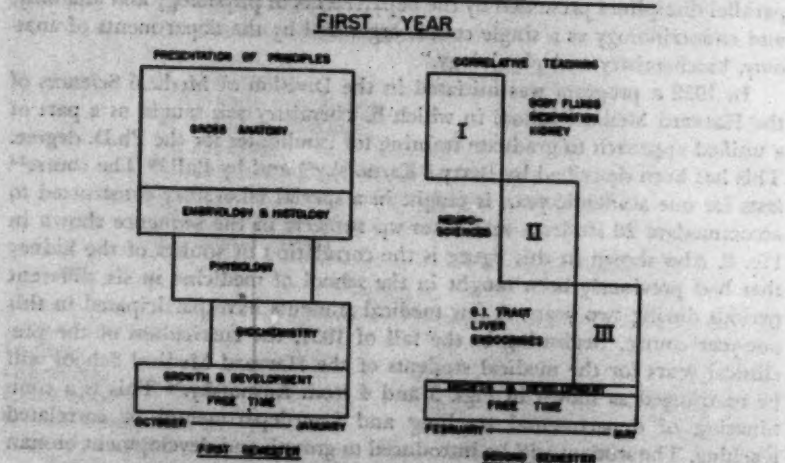


FIGURE 3. Arrangement of the program in medical education to be initiated for first-year students in the Harvard Medical School in September 1957, from Karnovsky.²¹

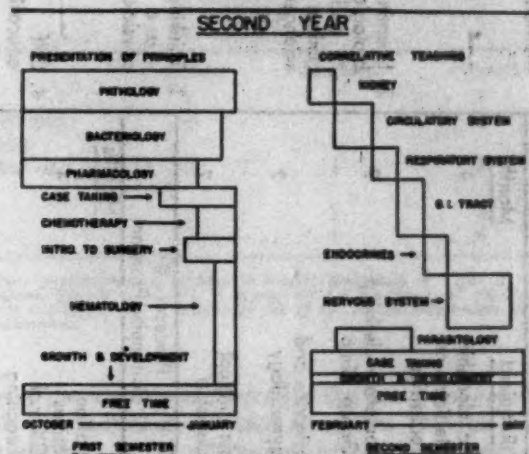


FIGURE 4. Arrangements for the second-year students at Harvard Medical School.

lum^{36,37,38-39} as outlined in Table 4. This followed an extended period of planning.^{30,31} In this program the teaching of biochemistry, for example, was integrated into the first year program as reported by Wood³² and shown in Table 5. The broad educational objectives of the whole program are indicated in Table 4, and the sequence of teaching of subjects by interdepartmental subject committees is shown for the three phases. Each student is required to participate in a project and to write a thesis report concerning his project study. The intramural preceptor program begins in the first year with each student studying the growth and development of a normal infant as a member of a family.^{33,34,47} A group of eight students works with one preceptor for Phase 1. The clinical program continues in Phase 2 with the case method, each group of eight students working with two preceptors. In Phase 3 a preceptor works with eight students for the extended observation of patients in a continuity program for ambulatory patients. The required clerkships constitute ten months of Phase 3. The free time and electives are indicated for all four years. Two classes have graduated under this program which is continuing in the form that is outlined. Evaluation of the students during the program has been initiated.⁴⁴⁻⁴⁸

Johns Hopkins University has decided³⁰ to initiate a revised program of education in which a limited number of students will be allowed to enter the Johns Hopkins School of Medicine after the sophomore year of college. These students will continue to be enrolled in the college for three years and will have one year of internship, in obtaining AB and MD degrees, as indicated in Table 6. Students may save two years by this program and may continue their association with the liberal arts college for a period of five years. All students in this program can save at least one year over the current program. In reporting the proposed program, the statement is made:³⁰

PHASE 1 Normal Biology of Man (two semesters)			PHASE 2 Principles of Medicine (three semesters)		PHASE 3 Clinical Medicine (sixteen months)	
Projects 1 day/week	Phase 2A	Projects 1 day/week	Phase 2B (one semester)	Biodi- clinical study sections	Thesis report	
Cell biology* Tissue biology neuro-muscular Cardiovascular respiratory Metabolism Endocrine Correlation and review	Introduction to disease Infectious disease Chemical agents Cardiovascular Respiratory Hemopoietic Gastro-intestinal Urinary disease Male genitalia Skin	Locomotor system Nervous system Ophthalmology Female genital disease Endocrine, metabolic disease Legal medicine; psychiatry; 1 hour per week	Required	Months	4	1. Learning scientific method
*Biostatistics Introduction to library first three weeks	Psychiatry 1 or 2 hours/week	Anatomy on adult cadaver (three semesters)	Basic clerkship Medicine or Pediatrics	Ambulatory clerkship Group clinic	2	2. Learning biologic and clinical sciences
Preceptor #1 Infant and family	Preceptor #2, 3 Clinical method	Preceptor #4 Continuity Program	Obstetrics and gynecology	Basic surgical clerkship	2	3. Thinking as a physician
Free Time one and one half days are free			Vacation Electives Clinical Teaching Research Biologic science	Months	2 4	4. Self education
First Year	Second Year	Third Year	Fourth Year			

OBJECTIVES:

1. Learning scientific method
2. Learning biologic and clinical sciences
3. Thinking as a physician
4. Self education

TABLE 4. An outline of the objectives and program which was initiated in 1952 in the School of Medicine of Western Reserve University.

TABLE 5

	Anatomy	Biochem.	Physiol.	Others
Cell Biology	1	3	1	3
Tissue Biology and Neuro-Muscular	4	1	2	2
Cardiovascular and Respiratory	2	1	2	1
Metabolism	2	2	3	1
Endocrines	2	1	4	1

Faculty members participating in teaching in subject committees in Phase 1, in the School of Medicine of Western Reserve University. A member of the department of microbiology participates in the teaching of cell biology and a member of one of the clinical departments participates in each of the subject committees.

"In spite of the manifest excellence of the American system of medical education, in the evolution of which the Johns Hopkins University has played a significant role, there have emerged in recent years a number of serious defects. The most important of these are: (1) the excessive number of years required to train a physician, (2) the dichotomy which exists between the liberal arts and the medical sciences, and (3) the noticeable decline of strength which has recently developed in the basic science departments of medical schools."

Other medical schools are planning or experimenting with continuing education in the liberal arts college during the period of medical education. This is being done at the University of Vermont for a limited number of students and is being planned at Stanford University.

It is emphasized that carefully considered changes in medical education are being carried out in many schools of medicine with freedom and backing by the Council on Medical Education and Hospitals of the American Medical Association, by the Association of American Medical Colleges, and by the licensing boards of the states. The democratic method of evolution of these programs by faculty committees^{2, 10, 17, 22, 24, 21, 28} has been a major feature. The experimental method has been introduced in many instances and offers benefits of the scientific method to this field of education.

TABLE 6

Revised program of medical education in the Johns Hopkins University. (Details of course schedules are tentative.)

Year	College (Homewood)	School of Medicine	April 1957
1	Requirements are		
2	biology and chemistry	(no courses)	
3	Elementary physics, two courses in social and humanistic subjects (40 weeks, 1680 hours; 750 hours unscheduled)	Biochemistry I; organic, quantitative, physical chem- istry; statistics, genetics	

4	One elective course in a subject other than natural sciences	Anatomy, embryology, cultural anthropology, social psychology, biochemistry II, biophysics, physiology, history, philosophy of science, medical psychology
(40 weeks, 1680 hours; 575 hours unscheduled)		
5	One elective course in a subject other than natural sciences	Microbiology, pathology, pharmacology, interviewing of patients, clinical diagnosis, laboratory methods of diagnosis, radiology
(40 weeks, 1680 hours; 475 hours unscheduled)		
Students eligible for AB degree		
6	No courses required, unscheduled time may be used	Medicine, neurology, dermatology, surgical specialties; psychiatry; preventive medicine and public health; obstetrics and gynecology; radiology; ophthalmology; amphitheater clinics
(40 weeks, 1680 hours; 350 hours unscheduled)		
7	No courses	Rotating internship; medicine, neurology; psychiatry; surgery, surgical specialties; pediatrics; obstetrics and gynecology
(12 months: 2 months elective period; 2 weeks vacation)		
Students eligible for MD degree		

Students may enter the School of Medicine and obtain both AB and MD degrees and one year of internship as follows. The usual time in United States to obtain this training is nine years.

Number of years of completed college work	Entry into medical school	Years to obtain AB, MD, and one year's internship	Shortening of course in years
2	First year	7	2
3	First year or Second year	8	1
4	Second year	7	2
		8	1

(Students are carefully selected in all instances.)

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Recorder's Statement

BRIAN SPENCER, M.D.*

Monday, June 24

FOLLOWING the talk on the Philosophy of United States Higher Education by Dr. Henning Larsen a survey was made of premedical education in the various countries of the members of the discussion group.

It immediately became apparent that there was little comparison between higher education in the United States and in other countries; Columbia, Costa Rica, Indonesia, India, Hong Kong, Germany and Great Britain all rely mainly on the European educational system in which the student proceeds directly to the Medical School on completion of his high school education without any preliminary study in a college. In all of these countries one year of premedical education in chemistry, physics and biology is provided within the medical school although in some countries, such as Great Britain, dispensation can be obtained if these subjects have been studied at the required level at high school.

The disparity between the American and European systems was seen to lie in the fact that, in the European system, high school students are carefully selected by examination. This selection ensures that a fewer number, but a better class of students attends high school thus enabling teaching standards to be set at a higher level than in the United States. One might epitomize by saying that "high school education in the United States is pitched to the level of the lowest intellect whilst in the European system it is pitched to that of the highest." Most of the group participants felt that the good student was severely penalized under the American system of education.

During the last two or three years of study in the European-style high schools, students specialize in either arts or sciences and in many countries they study only three or four subjects at this stage. At 18 years old the successful student has received a good formal education which provides a sufficient groundwork on which to base medical training without any further basic teaching. The standard generally attained is equivalent to about two years of American college and, in some countries, students educated to the so-called "scholarship level" are at a decidedly higher level.

The American student it was argued received a much more liberal education with a better and more widely based grounding in the arts and social

*This is a report from a foreign scholar, appointed as Recorder in one of the group discussion sections. Dr. Spencer is from the University of Wales, Cardiff, Wales.

sciences. Here again the disparity between the two educational systems was inevitably discussed. Under the European system the student is expected to educate himself concerning the forementioned topics and usually does so. The emphasis in all the teaching, although seemingly well-disguised to the student, is the training of intellectual power; little attempt is made to tell students of topics about which they can probably better inform themselves. The wider reading habits of the average European-style high school graduate compared with those of the American college graduate was favorably commented on.

Although the group participants thought that in the long run American higher educational methods turned out a "well rounded" student they also felt that there was a considerable waste of time and taxpayers' money. The United States system is, to a certain extent, the wasteful system of a wealthy country where the extra benefits which accrue from the system are scarcely justified by its demands (such as need for a large number of teachers, etc.). Several participants noted that in their countries it would not be feasible to tie up so many young people for such a long time.

That American educators are aware of the problems inherent in their present system became apparent. Of particular interest was the realization that medical education is now considered by some to be far too long and steps taken to remedy this situation, such as the Hopkins' experiment, were discussed.

Inevitably in discussions of this nature comparisons between the American system and the systems under which the group participants were themselves trained and which they now practice are bound to be made. It might have been advantageous to have had a carefully compiled comparison made by experienced European medical educators as well as American.

Tuesday, June 25

Dr. Glaser's talk on "The Evaluation of the Applicant for Medical Education" stimulated some lively discussion.

A survey of methods of selection of students in the group participants' various countries showed that they fell into two categories. There were those countries, including Greece, Germany, India, Hong Kong and Great Britain, where the situation and methods were similar to those in the United States. Other countries place no restriction on entry into the medical school, entrance being gained by all high school graduates who so desire. Selection in such cases is reduced to a dependence on a high mortality rate at the end of the first or second year based on academic achievement. Countries working under this type of system include Australia, where an anachronistic charter to the universities in the time of Queen Victoria is responsible; Indonesia, where it is a product of the first flush of their newly found democracy; and in certain South American countries where it is based on political issues.

It was generally agreed that selection of students based not only on academic achievement but also on moral issues was desirable. The methods by

which this should be carried out are many and debatable. A successful method of selection should result in 100 per cent graduation of the selected candidates but some latitude to accommodate human foibles and weaknesses must be obviously allowed. The problem would seem to be not the selection or rejection of the good or bad student but in the assessment of the potential of the average student who constitutes the main bulk of the applicants. There seemed to be among the group a feeling that in these present days of over-subscription for places in medical schools it was far better to reject a few doubtful students who might pass rather than admit one who might prove to be a failure.

The value of the interview was generally recognized despite the gloomy correlations which have been made between behaviour in interviews and subsequent progress. The psychological testing of medical students appeared to be very much an American preserve but its worth in rejecting psychopaths was noted. The group participants were eager to see a representative Medical College Admissions Test but eagerness waned when it was pointed out that the only way to see the test was to sit it. Some of the group thought it strange that some deans of American medical schools who have never actually seen a M.C.A. Test will admit students who have been selected partly on their performance in this test.

Comment was made concerning the low failure rates in American medical schools as compared to the higher rates in European-style schools. That American selectors did a better job was recognized but it was pointed out that they have more knowledge of the student on which to base their selection. The average candidate in the United States is about 21 years old with usually two or three years of college education behind him. A certain amount of self selection is evident by this time and the student has a fair idea of his own capabilities. His performance under university style education is known to the selector who also has the benefit of the personal opinions of the student's instructors. Under the European system the candidate is usually 18 years old and just finishing high school. Assessment is more difficult under these circumstances and probably accounts for the higher mortality rates at the end of the first and second years of medical school.

Wednesday, June 26

Discussion on the third day became more varied as members of the group brought their special interests to the attention of the chairman.

The question of whether teachers in the basic medical sciences should be M.D. or Ph.D. was aired. The chairman outlined the American situation where the law of supply and demand for medically qualified men is such that many of the teaching positions must go to scientists. He thought that this state of affairs had brought about a desirable change and thought that it was the aim of most medical schools to achieve a basic medical science faculty in which pure scientists and medically qualified persons were evenly balanced. Most countries appear to be tending towards a similar position

but at the present time the Ph.D. is in the minority in all countries with the possible exception of Great Britain. In some countries, Germany and Greece in particular, all teaching is carried out by medically qualified persons. With the increased interest in research the part played by the person with a purely scientific training is becoming increasingly important. As regards teaching basic medical science it was noted that both the scientifically and medically trained persons need to learn a little of the others discipline in order to become effective teachers.

The depths of student participation in medical education was examined. In some more unsettled countries students actually chose the Rector of the universities. The importance of a balance between *security* and *liberty* was emphasized by the chairman who also outlined student participation programmes in American universities. Parent-Teachers Associations were pointed to as stabilizing influences.

The question of the amount of time a clinical teacher should be allowed to devote to private practice was discussed. The situations varied from country to country and indeed from university to university. It was generally agreed that strict full-time was desirable but not always attainable. The help given to medical school finances by the work of surgeons and obstetricians was noted but the difficulties of distributing such monies in some circumstances was emphasized.

The recent trends in the teaching of the basic medical sciences were examined. The Western Reserve and Johns Hopkin's experiments were treated briefly while particular attention was given to the treatment of anatomy as cellular biology with the emphasis on physiological correlation with morphology. The resistance of some anatomists to these current trends, especially in some of the European style schools was deplored, although there were those who argued in favour of this.

Other subjects discussed included internships, foreign students in the United States, the finance of medical schools, choice of staff, etc. The extent and breadth of the discussion indicated something of the enthusiasm of the group, their awareness of the problems involved in medical education and their earnestness in attempting to solve them.

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- DR. DAMRINO BRJANLAYA**
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Bangkok, Thailand
- DR. FRANK BERGAN**
Ullevål Hospital
Oslo Norway
- DR. JESUS BOTERO**
University of Antioquia Faculty of
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Medellin, Columbia
- DR. GIANFRANCO DAL SANTO**
University of Sassari
Sassari, Italy
- DR. HEONIE DA ROCHA**
University of Bahia Salvador
Bahia, Brazil
- DR. DAVID DAVIS**
So. Ockendon Hospital
Glasgow, Scotland
- DR. JORGE VENGARA DELGADO**
National University
Bogota, Colombia
- DR. REYNOUT DONKER**
Free University
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- DR. EVA G. EREN**
University of Sydney
Sydney, Australia
- DR. J. H. FENNER**
Oxford University
Oxford, England
- DR. J. DROOGLEVER FORTUYN**
University of Groningen
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- DR. WALTER FROMMHOLO**
Free University of Berlin
Berlin, Germany
- DR. NUPENDRA C. GANGULI**
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- DR. HIROO HAYASHI**
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University of Helsinki
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- DR. TAKUYA KANEHISA**
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FIRST ROW, LEFT TO RIGHT: Dr. Damvong Lebanya, Dr. Oumouin Shih, Dr. Linacruia, Dr. Hentic de Zells, Miss Elizabeth P. Lam, Dr. Ilse Schwinck, Miss Eric Roberts, Dr. Eva G. Eden, Dr. Marjorie Lee, Mrs. Nialmayer, Dr. Nepitrida C. Galuli, Dr. Francis G. Zells.

SECOND ROW, LEFT TO RIGHT: Dr. Emanuel Brice, Dr. Frank Bergan, Dr. Jorge Salas, Dr. Victor Baranco, Dr. Ingolf Stahl, Dr. Omar Sosa, Dr. J. Drogelavren.

THIRD ROW, LEFT TO RIGHT: Dr. A. Slugh, Dr. Yasyoul Nilamir, Dr. Stavros A. Makafotomelos, Dr. Susan Wade, Brian Spencer, Dr. Ulrich Reusse, Dr. John Z. Stevens, Dr. David Davis, Dr. Richard H. Young, Dr. H. F. Fiedler, Dr. K. Smith, Dr. Eric W. Williams, Mr. Ned Paul, Dr. William Delaney, Dr. Takuya Kanakida.

FOURTH ROW, LEFT TO RIGHT: Dr. Joseph C. Binnig, Dr. Edward L. Turner, Dr. Tobias Tolassen, Dr. Edgar S. Gordon, Dr. Jorge Versano, Dr. Juan Jose Jurefelfelt, Dr. Jesus Guastareno Dal Santa, Dr. Carl E. Taylor, Dr. R. K. E. Anderson, Dr. John H. Fisher, Dr. Raymond Donner, Howard M. Kline, Dr. T. Hale-Hill, Dr. Robert J. Glauber, Dr.

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